August 1958

THE NAVAL AVIATION SAFETY REVIEW

NAVAER-00-75-510

approach

LETTERS

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U.S. Naval Aviation Safety Center.

Training Tip

Sir:

One morning a young marine radar controller was just relieved from watch in the trailer. Going outside he noticed an A4D-1 taxiing into position for takeoff. He spotted red streamers hanging from the wing tips and landing gear and he immediately returned to the trailer and called the tower, informing them of what he had seen. The jet was recalled to the line.

One important factor was the fact that this radar controller used to be a tower controller and knew the meaning of red streamers. I'm sorry to say some of my crew did not know this—I am wondering how many are in the same category.

Some items of indoctrination for new personnel assigned to aviation might be as follows (not a complete list of course):

- Meaning of red streamers on aircraft
- How to open canopy of all aircraft aboard their station
- Correct wearing of parachute
- Water ditching

INTERESTED MARINE

Convert

Sir:

Reference issue of April 1958, page 3, bottom of center column. Haven't you all heard that ASO has (back in 1957) converted to Fed. stock numbers and that the vest is now R8415-30(-5431-GF50?!

I am the poor, overworked civilian who has to convert these wrong stock numbers before material can be issued!

DESPAIRINGLY

Your point is well taken — we goofed! Until recently, Headmouse has been without the services of a Supply Corps Officer. It is hoped that the error of the type you mentioned will not occur in the future.

Look Out

Sir:

. . . Suggest you continue to emphasize midair collisions. I still catch both pilots with their noses in the facility charts—no one looking out except GOD. . .

FLIGHT SURGEON

No Favorites

Sir:

I am of the opinion that most CO's tolerate safety programs — and tolerate their Safety Officers because of CNO, etc., directives. I have had experience with one that also felt "too much safety makes a pilot fearful!". . .

Suggest a section similar to "Notes from Your Flight Surgeon" —as Notes from the "OLD MAN" or similar—the idea—publish thoughts and recommendations of CO's so that they know they "TOO" are in the picture and running. Look into the history of the squadron with the high accident rate and find a Safety Officer who has no real backing from his CO. The Safety Officer can't write up the CO!. . .

DOCTOR

Agree that a negative program can make pilots fearful, whereas, a positive program with positive leadership achieves safety improvement as an integral part of everyone's efforts to improve the big picture—combat readiness and reliability!

Disagree that CO's don't back safety officers. Fewer accidents, sound endorsements on AARs, and many thoughtful official and unofficial letters from CO's to NASC and APPROACH *show that many, many do back the ASO and the program. This is not the place to mollycoddle or chastise command, but for the record it should also be said that skippers have to live with many things not of their own choosing or making.*

Bad Practice

Sir:

On page 28 of the May issue is an article called "Demonstration," which explained how an S2F engine was damaged from oil starvation during a practice feathering demonstration.

I was surprised that you didn't berate the pilot for using the emergency fuel oil shut off to practice feathering.

This practice is taboo at our station due to almost immediate loss of oil pressure and strong possibilities of engine damage prior to getting the propeller feathered.

Equally gratifying results can be obtained by shutting off the main fuel valve to the engine that is to be feathered.

FRANK KEYES
ASO, NAS, Minneapolis

Free Slide Rules

Sir:

Enclosed is one of our new Torque Wrench Adapter slide rules.

We would be happy to send these adapter slide rules to any individuals making direct inquiry to our company.

P. A. STURTEVANT CO.
Addison, Illinois

For picture and other details please see page 45.

Team Approach

Sir:

I believe that articles as "I Almost Killed LT. Smith" in the September issue should appear more frequently.

The role of the AM, AD, AC, . . . is a very important one and too frequently. they receive too little recognition. Much more could be said in this vein, however, inclusion of such articles would help to round out the magazine so as to include *all* members of the team.

FLIGHT SURGEON

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THE COVER

Two widely separate sources contributed to this month's theme cover; the painting reproduced in full above, courtesy of the Pittsburgh Plan for Art, is by *Approach* staffer Bob Trotter; the WestPac whopper, which may evoke vivid memories from those who were there in August, 1946, is from Fleet Weather Facility files.

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IN THIS ISSUE

Vol. 4 No. 2

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urposes and Policies: This periodical contains the most accurate inormation currently available on the subject of aviation accident preention. Contents should not be construed as regulations, orders, or irectives unless so stated. Material extracted from Aircraft Accident eports, (OpNav 3750-1), Aircraft FLIGA Report (3750-10, and nymouse (anonymous) Reports may not be construed as incriminating nder Art. 31, UCMJ. Names used in accident stories are fictitious nless stated otherwise. Photos: Official Navy or as otherwise credited. To assure use of the latest available information, Non-naval activities re requested to contact NASC prior to reprinting APPROACH material. **orrespondence:** Contributions are welcome as are comments and criticisms. Address correspondence to U. S. Naval Aviation Safety Center, NAS Norfolk 11, Va. No payment can be made for manuscripts submitted for publication. The Editor reserves the right to make any editorial changes in manuscripts which he believes will improve the material without altering the intended meaning. Views expressed in guest written articles are not necessarily those of the Naval Aviation Safety Center.

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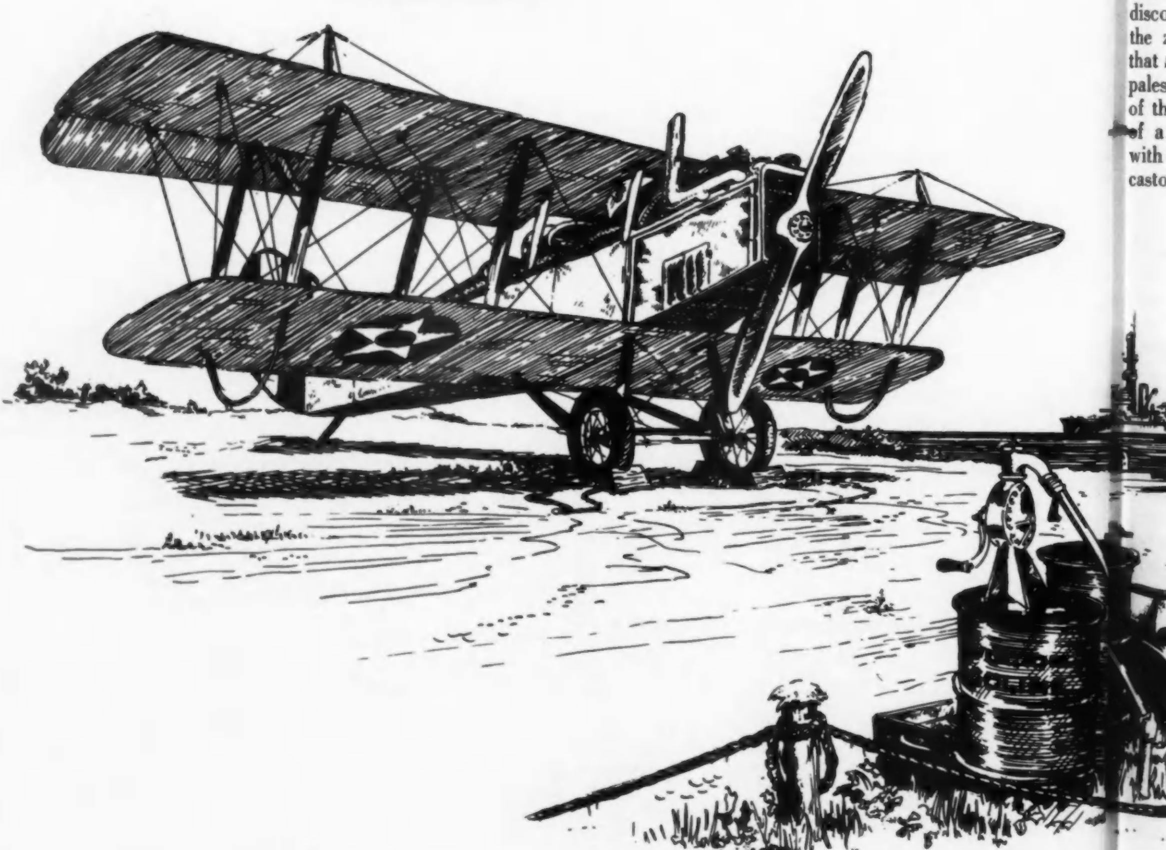
IN THE BEGN

By
LCDR R. P. Brewer
Asst. Air operations Officer
USS INTREPID



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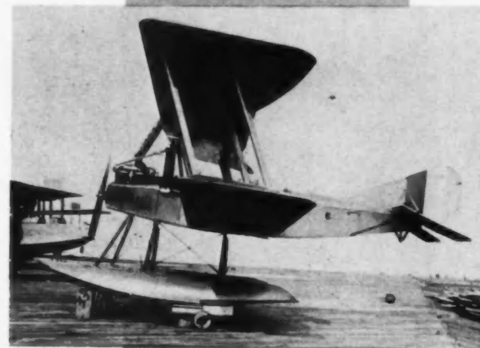
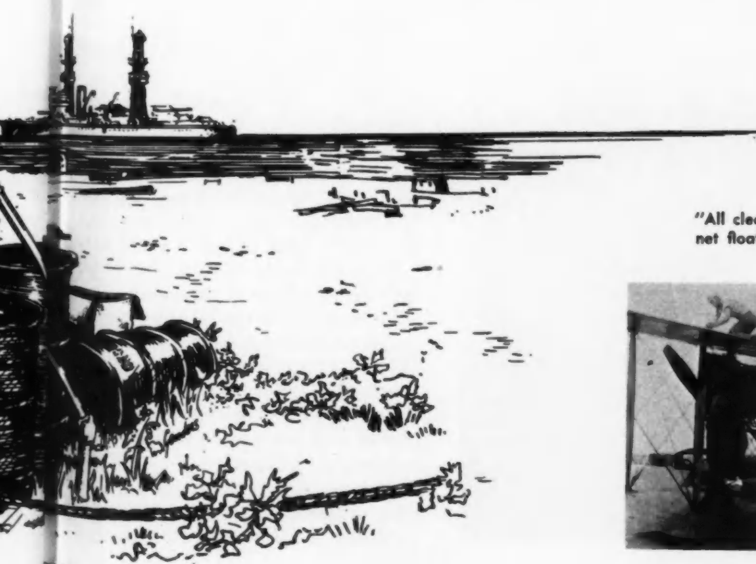
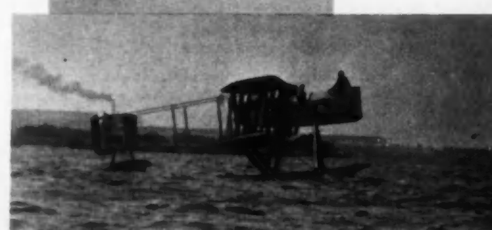


She's a real dreamboat, but watch those right-hand turns—cockpit checkouts were almost superfluous—nothing in the cockpit!

PEOPLE and pilots being what they are, when two or more generations of airplane drivers get together to talk shop—shop-talk still takes precedence over the Number Two Subject by a narrow margin—seems as if the tales the old boys spin just naturally dominate the conversation. Young bucks discover, after a few unrewarding efforts to depict the zest of sonic flight and stratospheric heights, that *their* petty world of afterburners and electronics pales into insignificance beside the soaring exploits of the Elder Pilot. How can the kerosene contrail of a thousand-knot magnesium monster compare with the heady perfume of airplane dope and burnt castor oil?

"I'm givin' her all she's got Lootinint, but we ain't gittin' anywhere."—Beach operations required close coordination. . .





"All clear ahead!" A good lookout was worth his weight in fish net floats in this historic model, the N-1.

Refueling operations were invariably "canned"—Note 25/30 octane coming aboard lower right.

Continued from preceding page

Yessiree, when the old boy begins to weave a yarn there's a certain magic glow about the Past that makes "way back when" the golden era which the rest of us unfortunates missed.

There is, however, some considerable evidence to show that the good old days were not without their pitfalls and prattfalls —the very same kind of troubles we still urge you to avoid. Matter of fact, there's a surprising similarity in the pattern of bang and prang down through the years. The principal difference between Then and Now seems to be that when spruce and glue and linen were replaced by titanium and flush riveting, the prangs merely became noisier, the repairs got awfully expensive, and bodily damage was not limited to bruises incurred in climbing down out of trees and haystacks.

Prompted by a curiosity as to just what was the accident picture in the stick-and-wire era, we poked into the dusty files of the Safety Center and came up with a portrait which is perhaps a bit more candid than that painted by the nostalgic brush of the greybeard yarn spinners. Mind vou, the exploits and achievements of this magnificent group of pioneers can never be belittled by the likes of us Johnnie-come-lately throttle benders. But if, amidst the constant nagging of folks who insist that you fly in a manner calculated to keep you a regular member of bull sessions, you can derive some comfort from the facts that the old folks had their share of troubles too, well, pull up a chair.

Final landings were not always as planned, as witness the unhappy return of this blimp car a-la-cart.

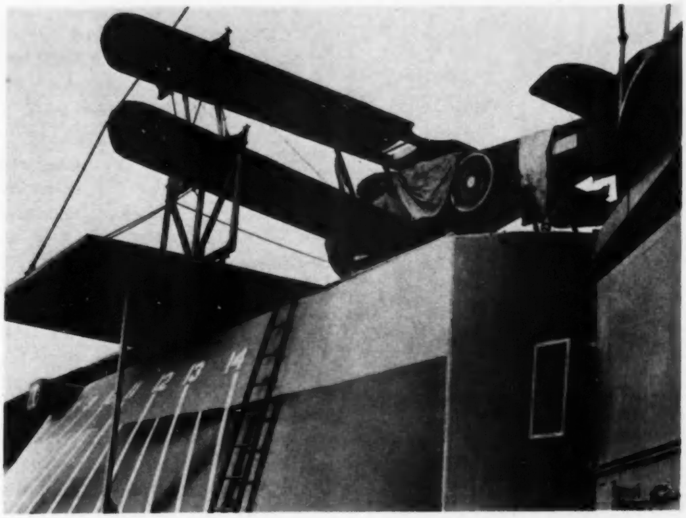
The official recording of accident data appears not to have gone back beyond 1920 — although it's pretty well established that there were numerous clouds of dust generated around the sod fields of yore—and we're pretty certain the lusty clatter of the OX-5 and its predecessors was often interrupted by the crunch of spruce and bamboo. As to the accident *rate* — well, it must have been pretty terrific during the fabled era when One Flight usually equalled One Crackup.

The first known AAR, as recorded on one side of a modest 5 x 6 card, is noted to have occurred on January 2, 1920. The name of the individual who thus achieved this dubious distinction was charitably unrecorded. The airplane involved was a something called a HS3L—no relation to the helicopter family of more recent designation.

The crash chroniclers of that early day were usually terse to the point of secretiveness concerning the details of flying fiascos, and this first one observes only that there were no injuries, and the aircraft suffered damage only to the "keel fittings." A neat package, uncluttered by tiresome conclusions as to cause factors, and completely free of the reproachful recommendations which give great pain to the makers of doctrine and airframes alike.

Accident Number Two of the official record accounts briefly for a vaguely untoward event involving a JN-6B, the revered

Battleship based VF types had their problems—such as battens for this *Sopwith* aboard USS TEXAS.



Jenny. This also happened on January 2—1920 was off with a bang.

Some four days later there is noted the first forced landing, made "in a heavy sea as a result of a gas line failure." Additional details, which must have been dramatic, if not tragic, are missing. The fundamental flight safety philosophy of passing along the experiences of others was yet to attain any formal status.

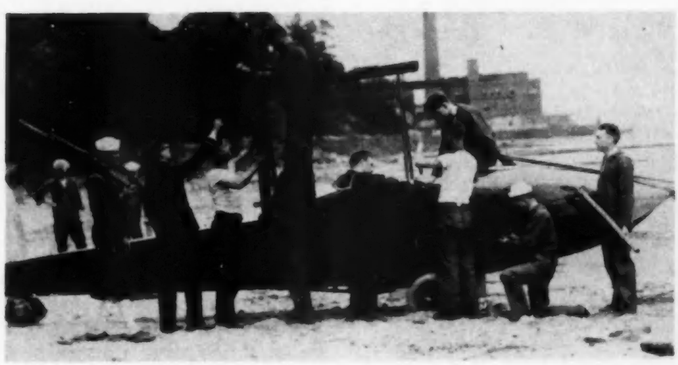
The next day, January 7, 1920, there occurred the first ground accident, when an N-9 was destroyed "due to handling and storage." From which fragment of intelligence one can only conclude that here was new evidence that there was indeed an era of iron men and wooden ships.

Moving along, and at quite a clip too, on January 13, the first Navy dirigible accident, so recorded, occurred as a result of a "rent in envelope." The uncertainties of test flying next are revealed when, on January 15, a Loening "Kitten" monoplane encountered difficulties which are sketchily recorded in an account chiefly notable for the wryly puzzled comment: "A peculiar airplane."

"Carrier" aviation enters the accident picture with an equally un-illuminating entry which notes merely that a *Sopwith Strutter* came a cropper in operations off the U.S.S. PENNSYLVANIA. This on January 29, 1920.

Interspersed through the record are numerous, exasperating notes which create vivid images of aerial drama—cryptic accounts of happenings the complete story of which can only be guessed. For example there is recurrently mentioned the thought provoking term "Kite balloon," which offers all kinds of mental pictures of pre-Vanguard experiments.

Teamwork in action—or perhaps, do it yourself assembly. Anyway, here are all the elements of skilled rates, adequate supervision, proper equipment and facilities, and security—or could that sentry be there for another purpose?



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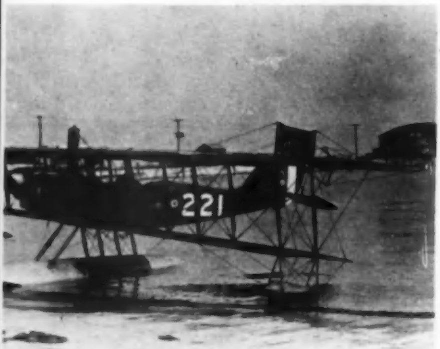


Even an old reliable such as the N-9 could be a bundle of trouble for proficiency pilots.

"...flew up a small creek..."

The first naval aviation fatality recorded in the card system happened on March 19, 1920 in a Pensacola accident. Cause: "Lack of judgment on part of the pilot."

Then there was the one which seemed to fall, literally, in a class by itself. A slightly heavier-than-air product called a T-5-L met with misfortune due to "failure of glue," and incidentally became the first recorded material failure. Seems the "failure" caused a strut to spring out of line, with unhappy results.

The names of the airplanes appearing on the accident cards read like a recognition journal of the day, had there been such a thing — Sopwith One-and-a-Half Strutter, HS-3L, HS-2, MF Boat, Martin, VE-7—all names to swear by or at, as the situation indicated.

Another "Kite balloon," there's that thing again, was struck by lightning in May, 1920 at San Pedro, California. Injuries, if any, to pilot, if any, unrecorded. The first fatal midair collision is listed as having occurred between an N-9 and an HS-2 at Pensacola. The pilot of the HS-2 was killed. Even then, it seems, there were times when things could move "faster than you think."

Some accidents appear to have resulted from certain occupational hazards peculiar to the times. Case in point is that of the JN-6D on June 19, 1920. This *Jenny* was taking off closely behind another airplane (no tower/radio control then, junior) which left a billowing cloud of dust (no runways either, Lieutenant) which obscured the view somewhat for the *Jenny* pilot. Midway in his takeoff run, the latter individual suddenly beheld a large stack of baled hay dead ahead. The pilot "jerked" the airplane around (no brakes, buster) to miss the haystack, and "slipped" on the left wing and nose. Damage to flier, flying machine and fodder, not known.

Free balloons drift occasionally through the picture, as on June 25, 1920, when some unknown aeronaut provided an early, if definitely not the last argument against "improper landing in a high wind."

All throughout this record of bamboo boo-boos, the startling similarity of cause factors, when compared to almost identical accidents down through the years, repeats itself with a regularity which speaks poorly for man's ability to profit from past experience. Take a look at some of these, partly classified by present day criteria — and lest you're prone to chuckle smugly at our ancestors' antics, try substituting current aircraft models and present day situations for these relatively ancient happenings.

Judgment: A Nieuport 28, on June 28, 1920, equipped with detachable wheels, managed to "retract" same permanently when the airplane struck the ground with exceptional force on landing, causing the wheels to part company with the airframe. This at a place called Hampton Roads, Virginia.

Facilities: A JN-6 hit a rut on landing, swerved and hit a tractor.

Pilot technique/judgement: An early Boeing pilot tried a loop, with too little airspeed, at 200 feet altitude. The plane fell off on the right wing. Survey damage, no injuries.

Proficiency: A Burgess-Curtiss N-9 accident was concluded to have resulted from "lack of practice on part of pilot, who had been recalled from inactive duty for 15 days . . ."

Maintenance/Material: The first passenger fatality is recorded on August 9, 1920, when a DH-4B (referred to as a "flaming coffin," if our War-Birds background serves us correctly) had an engine failure at low altitude due to gas line stoppage.

Pilot Error: The first recorded use of *this* familiar phrase is found in the account of an August 20, 1920 DH-4B accident. Airplane rolled off the field into the mud and flipped over on its back.

Planning/Weather Damage: On September 17, 1920, at Pensacola, a pilot was drowned and eight seaplanes were overturned and lost in a storm.

Supervision: First student fatality reported in November, 1921, in a VE-7.

Flight Planning/Fuel management: A sergeant, "not a graduate of Great Lakes nor an aviation man . . ." consequently not drawing flight pay, crashed a JN-6HG-1 on empty tanks. However, "in view of his previous excellent performance, no disciplinary action taken."

Disposition Board: Another, if unpleasant first, is noted on June 30, 1923, when there was recorded the first recommendation to examine a pilot for fitness for flying.

Maintenance / Personnel Error: On 1 August 1923, a VO-1 got a premature catapult shot from the U.S.S. RICHMOND. Probable reason for no injury: No personnel on board the aircraft at the time.

Aero-Medical: On 24 April 1924, following a fatal N-9 accident, there is reported the first instance of an autopsy. Results of the autopsy revealed that the pilot was "subject to fainting spells."

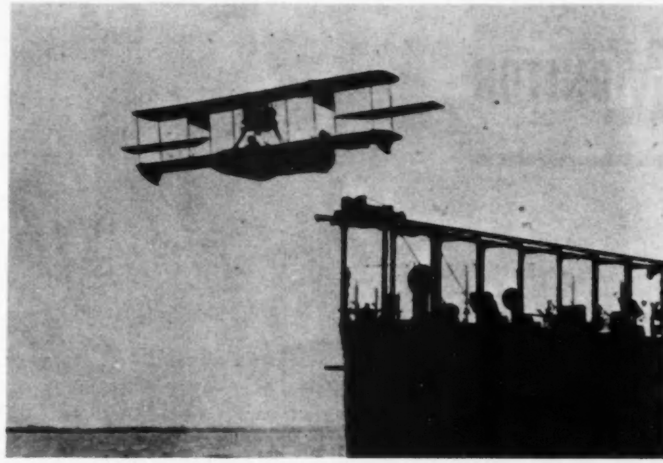
Technique: In 1925, during a carrier landing aboard the LANGLEY, a VE-9 hit the ramp, knocked the wheels off, was sent to a nearby NAS and landed with no injuries.

Judgment: September, 1924: Pilot of an HS-2L "flew up a small creek with insufficient altitude" (and doubtless without a paddle).

Experimental Test: During an experimental flight a TS-1 made a CV landing on the LANGLEY, which happened to be tied up at the dock at the time. Pilot settled at the ramp, but was "stopped by arresting gear."

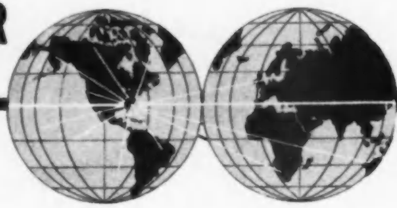
There, at least in part, is the first chapter of what was naval aviation's most colorful era. If certain aspects of this thumbnail sketch of the accident picture of 1920 seem vaguely familiar, perhaps it is because the total picture is a sort of daguerreotype of the same subject which has been reproduced all too often in naval aviation of 1958. Only the more recent addition of cinemascope-quality accident coverage and 3-D investigative methods have served to bring the background causes into clearer focus. The record is emphatically consistent on one point: people and hardware can mean trouble.

Knowing this, you can arrange to stay out of the accident picture simply by developing a professional appreciation of the lessons to be learned from the past. And that, the Old Pro will probably tell you, is what is known as avoiding over-exposure to trouble — by recognizing both capabilities *and* limitations of yourself and your airplane. •



And away we go! Cat shots, cold and hot such as this one of an AB3 from the USS NORTH CAROLINA, were always good for kicks.

MONITOR



EXCERPTS FROM REPORTS BY NAVY SAFETY COUNCILS THROUGHOUT THE WORLD, WHO PROVIDE LOCAL LEADERSHIP AND EMPHASIS TO THE NAVAL AVIATION SAFETY PROGRAM.

Dye Markers for Crashes in Water

Dye markers are placed, enclosed in a breakable glass container, within the wing of each aircraft. The container will break on impact, marking the spot of the crashed aircraft. Placing a delayed dye marker in the tail section would help locate the area of crash the next day.—*3rd MAW*

Stop Engines

Visiting multi-engine aircraft on 15-minute passenger stops have been observed loading or discharging passengers with both engines running. The Field Operations Officer will brief tower and line personnel to have pilots of visiting multi-engine aircraft cut the engine(s) on passenger door side.—*MCAS Quantico*

Pachyderm Polo

Normal landing in a 14,000 lb. aircraft at the recommended 120 KIAS . . . the kinetic energy your aircraft has at touchdown (neglecting residual idle power) is 8,950,000 ft-lbs., enough to knock a seven-ton elephant 638 feet straight up!—*CNAVantra Flight Safety*

Marking Drop Tanks

Marking drop tanks with squadron number or aircraft number. The marking of drop tanks in this manner may help in the search for lost aircraft both in restricting the efforts of searchers when a drop tank is located, and also to avoid being misled by the discovery of an unmarked tank inadvertently dropped from another aircraft. *3rd MAW.*

P-Boat Taxi Light

. . . landing lights were of little use in illuminating an area ahead of a taxiing P5M aircraft. The use of the Aldis lamp for clearing a taxi area ahead of a taxiing seaplane at night is the best means available although it provides little illumination. It was agreed that adequate control means should be utilized to prevent P5M aircraft from entering into areas infested with obstructions since it is conceivable that a pilot not under positive control and distracted with other problems of aircraft operation might become temporarily disoriented and taxi his aircraft into an area containing obstructions. VP-56 proposed a modification of the present landing light configuration which would allow a greater angle of extension thereby making them useful for area illumination ahead of the aircraft. Also proposed was a different type of light which could be operated continuously on the water without overheating.—*Chesapeake Area*

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Power Settling, or Power Induced Root Stall—concepts, or misconceptions? Herewith some spiral bound words by a seasoned instructor on the subject of

THE VICIOUS CIRCLE

By Lt. J. T. Gilstrap, USN

I'VE heard many questions and incredulous statements about the Anymouse article "Down, Down, Down" in the March '58 APPROACH. The comments and questions generally run something like this . . . "What happened?" . . . "Tain't possible to enter power settling when you maintain forward speed!" . . . etc.

Actually, this latter statement is right, too, but in another light it also looks very much like Anymouse experienced what should more properly be described as a Power Induced Root Stall.

When a helicopter rotor system slips into the circulation pattern known as the "vortex ring state," from an attempt to hover at or above the helicopter's hover ceiling, an unstable condition with respect to rate of descent versus power, presents itself. The term "power settling"

LT Gilstrap is currently a Principles of Flight Instructor at HTG-[illegible]. With his background of some [illegible] hours, he is preparing a [illegible] text on 'copter performance phenomena.

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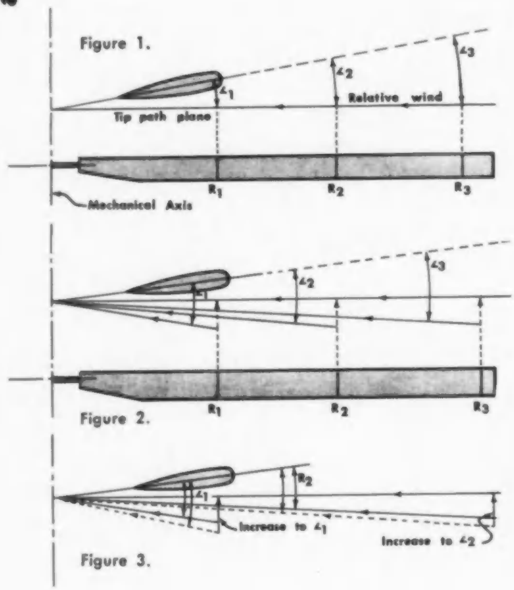


Figure 1.
The pitch angle and the angle of attack are equal when the relative wind and tip path plane coincide.

Figure 2.
Upward rotor thru flow from a descent is constant to all radii, thus angle of attack formed at these three points brings the root /tip ratio to exceed unity.

Figure 3.
The root/tip ratio is increased by an increase in rate of descent and the addition of weight by acceleration or physical addition. This happens because the through flow (upward component of relative wind) is increased equally to both roof and tip. The addition to X1 is greater than to X2.

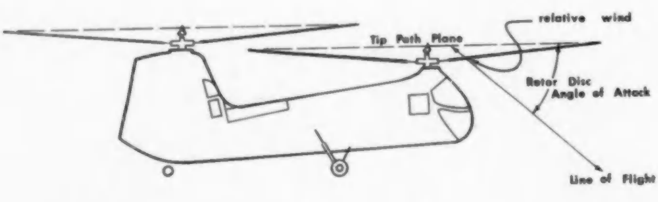


Figure 4.
As the line of flight approaches the vertical, the rotor disc angle of attack is increased.

has been associated, perhaps somewhat loosely, with this unstable condition.

In such cases, the downward induced flow is met by the upward flow of air caused by a descent, so, in effect, the resulting vortex system causes the *net* thrust of the rotor system to tend toward zero.

As the descent rate increases, the vortex system becomes intensified and power applied to stop the descent also intensifies the vortex.

Recovery may be accomplished by lowering the pitch angle and/ or by obtaining forward speed, the arch enemy of this type of power settling.*

Studies of power settling indicate that no stall condition is involved, and its occurrence is confined to airspeeds of 0 - 10 knots, roughly.

A more insidious condition, which we choose to call Power Induced Root Stall, is not necessarily confined in airspeeds, but it is more commonly encountered by the unwary pilot whose experience might parallel that which prompted this article.

What Happened

Let's review the situation. A ferry pilot refueled his HUP-2 in El Paso, for his cross country westward, and he probably filled it to its 900 lb. capacity. That would boost his gross weight above 5000 lb. Adding his own weight and that of a crewman, tie downs, tools and personal gear, it's likely that his gross weight was very close to the 5750 lb. sea level maximum allowed in emergency conditions for his takeoff.

The pilot proceeded westward at 6000 feet pressure altitude, then descended to 4500 feet to find a less turbulent level. His descent without regard to the factors which cause power settling ultimately gave him a good dose of it. His controls were twoblocked with full collective and forward cyclic. A flare executed with but inches to spare between his chopper and the desert floor saved his ferry squadron from holding the tab for one HUP fresh out of overhaul.

And Why

Why did it happen? The secret lay in the formation and variation of blade angle of attack by two primary factors:

1. The blade's rotational velocity, and
2. The relative wind's velocity

* The author suggests that readers review the article, "Down Collective,") APPROACH, Sep '56) and the letter to the editor by John Reeder of NACA (Jan. '57). Copies are available from NASC—Ed.

and direction to the blade as determined by the helicopter's flight path.

Blade angle of attack is determined by the combination of many factors which ultimately relate themselves to the relative wind in the airfoil cross-section diagram. It must first be realized that angle of attack is not constant from tip to root, except at one finely selected powered descent at a specific airspeed where the plane of the rotor and the relative wind coincide (see Figure 1).

An increase in the descent rate would cause the angle of attack near the hub of the rotor disc to become greater than at the tip. This ratio of the root angle of attack to the tip angle of attack, (i.e.) the root/tip ratio, would increase (exceed unity) directly with an increase in rate of descent (Figure 2).

Added Weight

What would happen if weight were suddenly added to a descending helicopter? The first result would be a faster descent, increasing the root/tip ratio, (figure 3) but if power (collective pitch) were added to prevent an increase in rate of descent, the result would be an *overall* increase in angle of attack with but minor decrease of the root/tip ratio.

The addition of weight to a helicopter need not be a physical addition to the airframe or in the cockpit. The effect can be created by acceleration parallel to the mechanical axis (rotor shaft), from gusts or from turns, pullouts, even transitions to hover.

All of these factors are so closely interwoven that it is hard to isolate them, but when you realize that an aircraft weighing 5400 lbs. at 1.0 G units will weigh effectively, 5940 lbs. at 1.1 G units, it is very easy to see that even the slightest acceleration factor, gust or otherwise, under marginal weight conditions, is sufficient to place a helicopter in a very hazardous situation.

"Density altitude . . . throws an additional curve in that it swipes a surprising amount of power from the unsupercharged engine . . . The pilot . . . must realize that he will encounter the 'area of reverse command' or the 'backside of the drag curve' long before he reaches the 'up collective' stop . . ."

Density Altitude

Density altitude must be considered because its aerodynamic effect is the same as weight, but it throws an additional curve in that it "swipes" a surprising amount of power from the unsupercharged engine, which the pilot just might be counting on in an emergency. (*See "Clipboard," page 48, for easy method of computing D.A.*) The helicopter pilot, while under the influence of a high D.A., must realize that he will encounter the "area of reverse command" or the "backside of the drag curve" long before he reaches the "up collective" stop, because there just wouldn't be enough power available to counter the induced drag created by an increased angle of attack.

Turns

RPM is another factor to be considered—lift is created as a squared function of the airfoil's velocity. Assume that the HUP rotor system is turning at 280 rpm and is capable of sustaining 5500 lbs with available manifold pressure. The loss of 20 turns, to 260 rpm, would reduce that capability to 4750 lbs., or a 13.7% weight reduction for a 7.1% reduction of rpm. (This, of course disregards the variations due to drag horsepower). The influence of the RPM reduc-

Continued from preceding page

"What would happen if weight were suddenly added to a descending helicopter? . . . The addition of weight . . . need not be a physical addition to the airframe or in the cockpit . . ."

tion is a minor point to *directly* determine angle of attack in the cross section vector diagram, but it places the helicopter at a disadvantage due to the increased blade loading and descent that results therefrom. The latter effect relates itself to a weight variation, which is the major influence to increase the blade angle of attack.

Collective A Factor

Collective pitch must obviously be a large factor to determine angle of attack, but its effect is not so direct as it may seem because every power change causes a proportionate change in the flow of air parallel to the rotor mast (induced flow).

This component, when modified by the flow of the free stream air derived by the helicopter's flight path, determines direction and velocity of the relative wind with respect to the blade. The angle of attack is defined by this vector and the airfoil chordline.

Recall that air has mass, therefore inertia, which will tend to resist a change in its velocity or direction. As an increment of pitch is added to the blade, the immediate effect is to add equal angle of attack increments to both extremes, tip and root. The induced flow of air will begin its response immediately and increase its downward movement.

When the transition of the induced flow is completed, the effect will be that of lessening the root/tip ratio.

In the presence of a high root/tip ratio, i.e., the angle of attack is already nearly critical, the indiscreet application of collective pitch could bring on disastrous results by immediately stalling the root area before the induced flow could be altered. The lag between pitch and flow should be kept at a minimum, always, but especially in the presence of critical weight conditions. This is done by using moderate collective pitch application rates.

The Vicious Circle

Now, why all the fuss about angle of attack?

Well, we learned that the ratio of root angle of attack to the tip angle of attack depends mostly on the rate of descent and collective pitch setting, while the mean angle of attack would primarily depend on the factors of weight, acceleration, density altitude, RPM, and collective pitch *transition.*

As an example, consider a blade which has an angle of attack of 9 degrees at the root and, perhaps 3 degrees at the tip. Adding the overall effects previously related would increase these angles to perhaps 15 degrees at the root and 9 degrees at the tip, and addition of 6 degrees to each. (These angles have *no* factual source. They are simply intended to serve as examples.)

But let's assume that the example's stalling angle is 13 degrees, so a small area near the rotor hub is stalled, reducing the lift-producing airfoil area. The root/tip ratio was lessened from 3.0 to 1.6, but the damage has already been done. This condition would cause a higher rate of descent, increasing the root-tip ratio again, thus stalling a still larger area of the motor disc.

If the pilot adds collective pitch to stop the descent, he adds to the mean angle of attack, stalling more disc area. Here you can see that the pilot is caught in a "vicious circle" which could ultimately lead to disaster.

Blade Twist

One final factor to make the modern helicopter more susceptible to power induced root stall is the twist built into the rotor blade to increase its efficiency in powered flight, or when the rotor disc angle of attack is negative (relative wind enters rotor disc from above). The blade currently used by Navy on the HUP-2 has about seven degrees greater pitch at the hub than at the tip, so it may be seen that this tends to become a disadvantage as the rotor disc angle of attack is increased.

The adage which says, "an ounce of prevention is worth a pound of cure," certainly applies here, because root stall will usually present itself somewhere near the ground in an approach, in which case there is very little that can be done to recover.

The most effective solution would be to lower the collective smoothly, only as far as necessary, to cause a lesser mean angle of attack, followed immediately by cautious reapplication of collective pitch throttle, and cyclic control to gain airspeed. This would be a calculated risk in proportion to the development of settling, because it may temporarily increase the rate of descent and root/tip ratio.

But the increase in forward speed would tend to lessen the rotor disc angle of attack, (figure 4), the angle of the relative wind's incidence to the rotor disc, which is the key to reducing the root/tip ratio. A little imagination might show that this can be done by "nosing over" as well. The latter would be very difficult in the HUP because the after rotor is generally more completely stalled than the forward one since it carries more collective pitch when forward cyclic is applied, causing a tendency to "nose up," just the opposite to that which is desired.

"If you must execute a descent, do it in such a way as to keep the rotor disc angle of attack at a minimum . . . make a nose-low, relatively fast approach . . . terminate the approach with a very moderate flare . . . until speed is dissipated sufficiently to allow a safe running landing."

"Studies of power settling indicate that no stall condition is involved, and its occurrence is confined to airspeeds of 0-10 knots roughly. A more insidous condition, which we choose to call Power-Induced Root Stall, is not necessarily confined in airspeeds, but it is more commonly encountered by the unwary pilot . . . ."

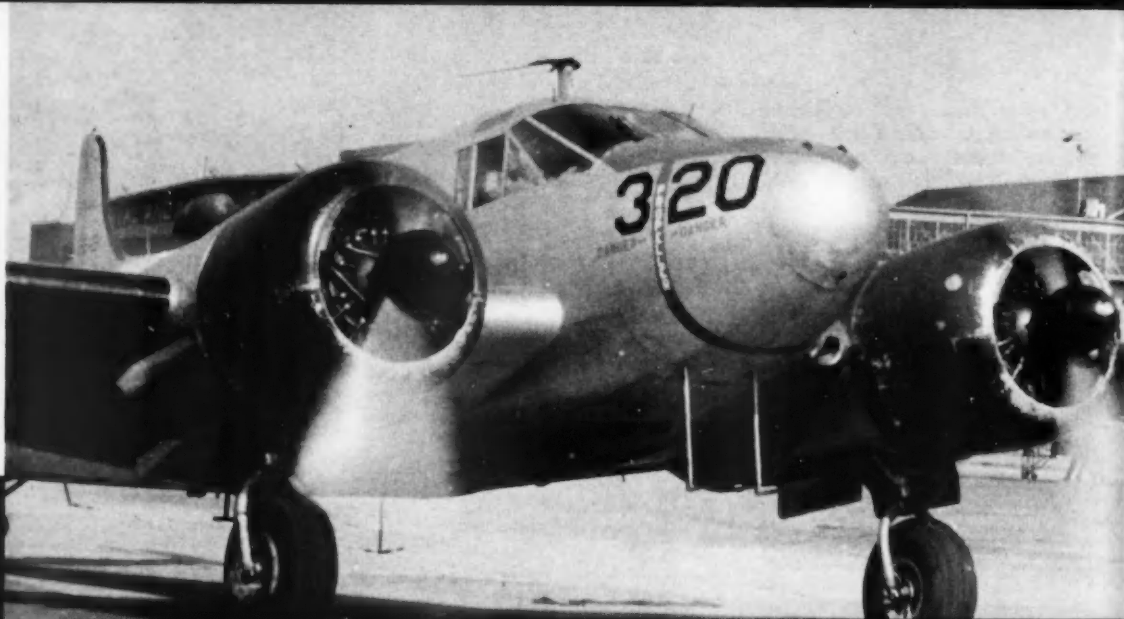
Ounce of Prevention

Unfortunately, the instinct of self-preservation votes a vigorous "nay" to lowering the collective when you're dropping like a stream-lined brick with tremendous vibration in the airframe, but cool heads and understanding will vote "aye" if it is at all possible.

Now, what about that ounce of prevention? If you must execute a descent, do it in such a way as to keep the rotor disc angle of attack at a minimum. In other words, make a nose low, relatively fast approach. Terminate the approach with a very moderate flare to "descend parallel to the ground" until speed is dissipated sufficiently to allow a safe running landing.

At the end of the flare, the helicopter will tend toward weightlessness, if it is properly done, and a compatible angle of attack will be sustained, possibly supplanted by ground effect or cushion.

So, friends, it appears that airspeed is not a limit on power settling or root stall, it just tends to disguise them. Under extreme conditions, one should always be prepared to prevent their occurrence—not to cope with them. •



"SWITCH TO GROUND CONTROL"

By Controller Bill Hare
NAS Jacksonville

SEEMS LIKE today's pilot spends much of his time in the cockpit changing radio channels; he's continually going to Channel 1, bingo button 15, ETC and ad infinitum.

Actually, there is no capsule cure for this condition. It's just the price we pay for going to the high frequencies with modern simplex radio equipment. No doubt many contemporaries of "Grampaw Pettibone" will fondly recall the good old pre-VHF duplex days of 3105, 6210, 3295 and 4495. About all you had to do then was shift to the high or low side of a coil.

'Why then," grumbles Ensign O'Speedbrake, "must we switch to Ground Control to talk to the same bunch of coffee-drinkers in the same room? This seems like a useless fumble, especially when I have to be looking out for jeeps, gas trucks and sun bathers on the taxiway."

Well, let's eyeball "Ground Control" from the tower's perch, and see just how it operates, in hopes that it will make one of these channel changes just a little less annoying. For the benefit of the uninitiated, the average "cage" on our larger bird sanctuaries comprises four operating positions: "B" stand or flight data, ground control, air control and approach control. Ground control can best be described as "Gontrol of all aircraft and vehicles in motion on the landing area," in addition to the duty idiot walking across the active runway. The normal progression of tower training is "B" stand, ground control, air control, approach control, separation center and employment by the CAA. While this does not hold true in all cases, you can see that you have a greater chance of having a less experienced man working ground control. This is just another reason why it is important that you be explicit in your request for taxi and other traffic with ground control.

When on a flight plan and requesting taxi instructions, always use your four digit bureau number. This prevents confusion with side numbers and will make the ground controller think before he taxies your SNB to a squadron arming area.

If your aircraft is not parked on the transient line, it is a good policy to state your location. Locally based aircraft using side calls pose no problem as the ground controller *should* know

the parking areas assigned to the various units.

If you filed IFR, it is a good idea to inform ground control of any excessive delay prior to actual takeoff. This enables the tower to request your ATC clearance at the proper time, thereby assisting the ARTC controller to fit your flight into the traffic picture. This will also prevent delays and on occasion can result in a more favorable altitude assignment. Think before you key your mike and use the ground control frequency for *all* traffic other than actual takeoff clearance.

After landing always switch to ground control upon clearing the duty runway. Again it is important that you use the ground control frequency for any traffic after the actual landing. The ground controller has *you* as his primary interest; the other controllers are observing air traffic and depending on ground control to keep you out of trouble. He can possibly prevent your hitting that obstruction marker in case you are busy checking your address book. If you have just cleared the duty and switched to ground control, identify yourself and state your destination, otherwise the conversation goes something like this: "Ground Control Navy 3117 for taxi, over." Whereupon the hard-charging ground controller immediately issues you taxi instructions to the duty runway, complete with time check to the nearest quarter minute. You counter with "Negat, ground control, this is 3117, taxi to the transient line." He parries with: "3117, what's your duration of stay?" Not to be outdone, you come right back with "This is 3117, two hours refuel and refile." Barring any "say agains" you are now approaching the transient line sans director and draw an RON parking space behind three *Cougars*, two T-28's and a *Beech*. So—why not do it this way—"Ground Control, this is Navy 3117—S2F just turned off the duty, request taxi instructions to the transient line, 3 hours." As a result the proper instructions are issued, line shack is notified, a taxi director is waiting, and you are assigned the proper parking space. And incidentally, even though you can't depend on it, remember that when you ask for *instructions* you're asking for guidance and information; if you ask for *clearance* someone's bound to assume that you know which way to go and you just want a green light to go that way.

". . . the other controllers are observing air traffic and depending on ground control to keep you out of trouble."

So—what are you accomplishing when you switch to ground control and maybe even talk to the same voice you just heard on tower freq? Most importantly, you're clearing the approach and local traffic channels for use by others. For the same reason that you're taxiing along on a 6000′ taxiway that's right parallel to the duty runway.

Remember, when the approach control and tower frequencies are clogged with ATC clearances, readbacks, taxi instructions, and notify Joe Blow, traffic isn't necessarily slowed — IT'S STOPPED. The end result is that the operational commitment wasn't met, a rough running engine wasn't heard, the Code 4 didn't get off on schedule, and the tower chief comes out of the Ops office muttering to himself about going into some peaceful line of business, like piano tuning.

We don't often get lonely in our high-sittin' glass cage, but we do welcome pilots during VFR off-peak hours. We'd like to visit you while you're on the job and get a closer appreciation of your problems too, but your office is just too crowded at 40,000—besides, we're subject to nosebleed even up here in the tower. So come visit us, won't you? And, oh yes, "Make an immediate left turn, do not taxi across the quarterdeck!"

RE: BRIEF

We were preparing to take the active runway in our P2V-3 after picking up a passenger on a navigational training flight. Our destination was NAS Corpus Christi, with a refueling stop at Scott AFB. After the runup, the tower told us to hold clear of the inboard parallel runway while an R6D made a GCA and touchdown. The weather at this time was VFR, but marginal, with haze and light fog.

The R6 finished his run and touched down on the outboard parallel, and while he was still rolling out, the tower cleared us for a takeoff on the inboard. We pulled out, applied the power and had the nose-wheel off the deck at about 85 knots. I had been watching the R6 all this time, and I saw him start to turn to cross the runway in front of me. I couldn't believe my eyes when I saw that he was actually crossing, not more than 2000 feet away.

I had already elected to continue the takeoff and try to fly by him. when my copilot apparently noticed him for the first time. He muttered something unintelligible and reached up and pulled the power all the way off. At this time we could not have stopped in the space left, the runway being wet, and our speed being what is was, and we surely would have hit the R6 if we had tried, because he was squarely in front of us, and seemed to fill the runway from side to side. I reapplied the power and pulled the aircraft off and immediately went into a turn to avoid his vertical stabilizer. We passed very close to the R6 and, incidentally, went on instruments to recover from the turn, the weather and lights being what they were.

After the excitement was over, we called the tower to ask what had happened. They informed us that they had told the R6 to hold, but couldn't reach him because he was still on GCA frequency. They did not warn us that the R6 was crossing.

Lessons learned from this incident:

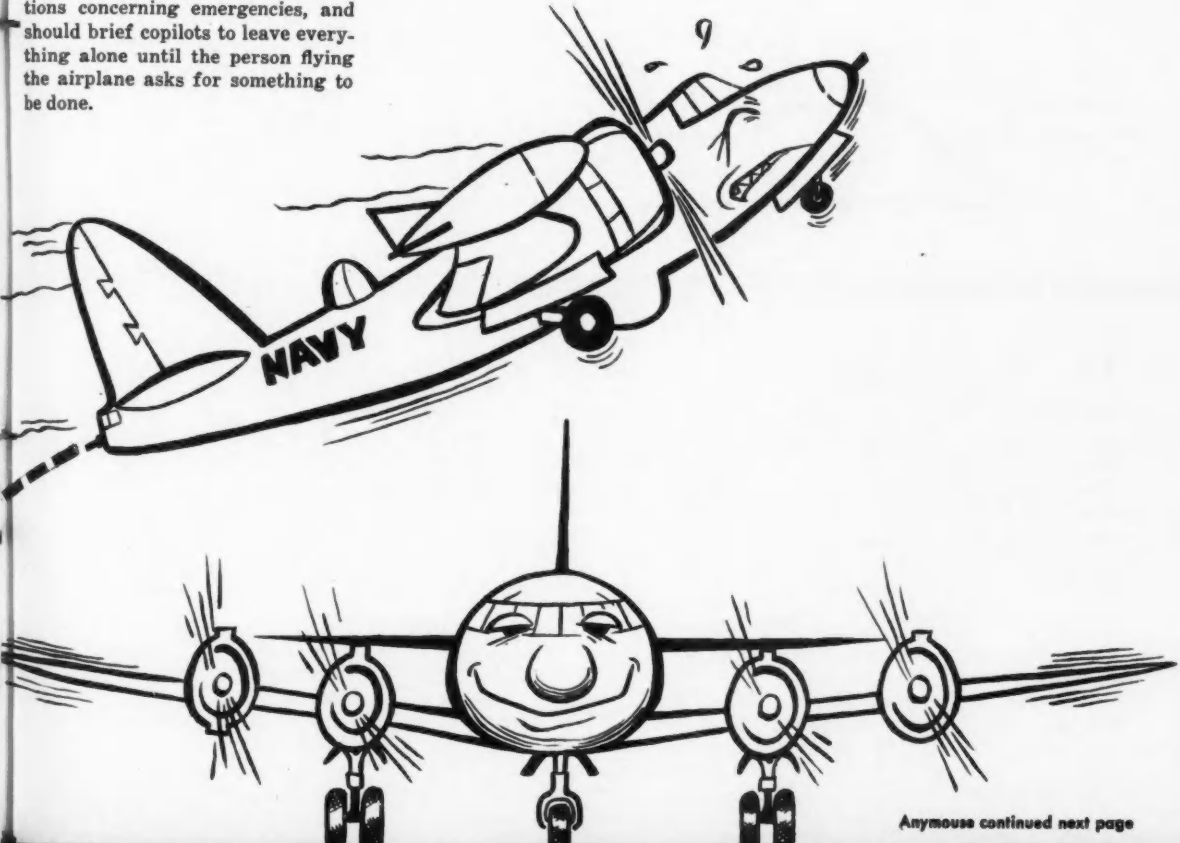
1. Be careful when cleared to takeoff from a parallel runway when there is traffic on the other. I was leary of this situation here, but assumed that the tower had everything under control. I should have followed my hunch.

2. When landing, especially under the control of an agency other than field traffic control, (i.e., GCA or Approach) do not leave the landing runway or otherwise deviate from your rollout path without first contacting the tower, or agency that is controlling all traffic.

3. Tower operators should remember that frequently when aircraft engines are idling, the pilots may not be able to use their radio receivers. Operators should not clear other traffic to move until participants of conflicting or possible conflicting traffic have received and acknowledged their instructions.

4. People who fly as copilots should train themselves to leave the controls alone in an emergency situation until specifically asked to do something by the pilot. In this

case, the copilot made a natural and spontaneous movement, which, because he did not have control of the airplane and did not know how close to flying it was, was the wrong movement. Pilots also should refrain from issuing blanket instructions concerning emergencies, and should brief copilots to leave everything alone until the person flying the airplane asks for something to be done.



Anymouse continued next page

ANYMOUSE

Continued from preceding page

I'M CONFESSIN'

This Anymouse is considered an old timer in the business—about 7000 hours and over 20 years, with lots of instrument time and, in short, should have the word.

So . . . Anymouse is flying a TV-2 from NAS Jacksonville to MCAS Cherry Point. Weather: 200 overcast at NIP with expected layers all the way to 30,000. From JAX north rapid clearing at flight level forecast with probably an undercast all the way. Destination is 5000 and five with light rain, forecast to improve. Anymouse decides it is no sweat in spite of the 200-foot ceiling at takeoff. After all, what's a green card for?

On the climbout it is a pleasant surprise to break into bright sunshine at a thousand feet instead of having to wade through layers of clouds. A fast call and Jax Center graciously allows a climb on course to altitude. Fine! Saved 20 minutes gas right there. And right there this Anymouse's overconfidence begins to take over.

It so happens the squadron has equipped this TV-2 with an Omni set of the coffee grinder type. This intrigues our hero no end and he welcomes the change to see how this thunderstorm-proof bird-dog will work in a jet. It works so well that by Charleston he has the ARN-6 tuned for good music and news and is enjoying a well-planned flight, in good weather, with all reporting points checking in right on the button.

Wilmington (IMN) is tuned on the good old Omni and some good music is on the good old-fashioned bird-dog. "It's time to call Wilmington radio and let them know I'm coming; nice to get an early clearance into the Cherry Point restricted area, you know." Wilmington bounced right back with the required clearance with instructions to call over Wilmington. SOP, no sweat.

But three minutes past IMN's ETA and I ain't there yet. Funny, because Myrtle Beach was right on time. Call Wilmington with a revision for three minutes later—couldn't be more than that—the vertical needle shows right on course and the little window still says "To." No worry, probably ran into some wind that wasn't supposed to be there. Five minutes later a station passage is finally indicated. Wilmington clears this Anymouse to contact approach control and at long last, Anymouse tunes NKT on the ARN-6 and gets a bearing indication of 140 degrees which is nearly off the right wing, which is really screwy because everyone knows the needle should point nearly straight ahead from Wilmington to Cherry Point.

Finally, the little birdy begins to chirp in Anymouse's head. He checks the Omni coffeegrinder and it is about right. He gives a good listen to the identification signal—and d——n near has apoplexy because the signal says, as plain as anything "EWN" (New Bern).

Anymouse proceeds meekly to follow the good old fashioned bird-dog home, makes an old fashioned penetration, firmly convinced that sometime during the past 20 years he left his old fashioned brains lying around someplace.

Now let's admit that 114.1 and 113.6 are fairly close on the coffeegrinder and .. — — –. sounds an awful lot like . .— — –. but Anymouse can guarantee one thing: Nowadays all nav aids in the airplane are tuned to nav aids on the ground and even my cross checks are cross-checked, which of course I learned a long time ago. Any doubt why this Anymouse prefers to remain anonymous?

AND HIS HAIRY TALES

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HAIRY TALES ABOUND IT SEEMS,
AND MUCH TO OTHERS' GLEE:
THEY SAY "IT HAPPENS TO OTHER
'HIMS'
BUT NEVER EVER ME."

I TOO WAS ONE OF THOSE DULL
FOLK,
WHO FLEW WITH HEAD STRAIGHT
UP AND LOCK'T,
WHILE BLISSFUL HOLES IN SKY DID
POKE
UNTIL ONE TIME, I WAS MOST
SHOCKED.

I SWITCHED MY TANKS ONE HAPPY
DAY,
WHILE CLOSE TO DECK AND NOT UP
HIGH,
AND SHORTLY AFTER HEARD ME
SAY,
"AH SO—BY GOR—THAT ONE IS
DRY."

SO HERE I SIT AND LOOK AROUND,
FAR OUT TO SEA AND NOT
AGROUND,
IN HOPES THAT WHAT I HERE MAY
WRITE
WILL HELP SOME OTHER SEE THE
LIGHT.

Experience was with water in drop tanks and not enough altitude. I was exonerated, along with another in the squadron who went in 15 seconds later and 10 miles away.

—Anymouse.

SPEAKING OF SPECIFICS

Recently this activity had an accident in which one pilot was killed and the other critically injured. From the accident investigation and report (conducted by another naval activity) it is readily apparent that the pilot made several mistakes in judgment, any one of which could have resulted in this accident.

To summarize the accident: the pilot filed and signed his own clearance VFR to a destination which was IFR at the time of takeoff, indicating he would file IFR enroute; he proceeded beyond his anticipated point of obtaining an IFR clearance into a designated mountainous area which had low ceilings and reduced visibilities in snow showers; when it became obvious he could not remain VFR he instructed the copilot to remain VFR and maintain the minimum en route altitude while he requested an IFR clearance; the aircraft crashed on the side of a 3740′ mountain at an altitude of 3100′.

The flight log filed with the flight plan indicated that the M.E.A., over that portion of the route on which the accident occurred, was 3000′ whereas actually the M.E.A. as set forth in pertinent publications is 5500′.

It can be assumed that the copilot upon being instructed to maintain M.E.A. and VFR glanced at the flight log, noted the 3000′ thereon, and when unable to maintain VFR felt safe in proceeding on instruments at 3000′. It is worth noting that the copilot had flown 3.7 hours in the preceding month and ex-

Continued from preceding page

cept for these few hours had not flown at all since 1954.

Upon receipt of the AAR for endorsement, it came to the attention of the personnel preparing the endorsement that the flight log filed and evidently used was not prepared by either pilot but by an enlisted man attached to the Operations Department. This information was not included in the endorsement, the thought being it was a local situation which could be handled locally without comment. However, several of the pilots at this activity, including the writer, are of the opinion that the preparation of flight plans/logs by other than the pilots performing the flights is not restricted to this activity but is widespread throughout the Navy.

This service is being performed primarily for persons having positions of increased responsibilities and the pilot in this case falls into that category. Granted, there is nothing prohibiting this service but having it done in no way relieves the pilot of his responsibility to check that any flight information prepared for him is correct.

This writer is of the opinion that one of the primary reasons for AARs and the publishing of them is their value to others as object lessons. We all try to learn a little something from someone else's mistake. This activity and the First Endorser were inclined to generalize and state that all of the factors leading up to the accident were a result of the pilot's failure to assume the responsibilities of an aircraft commander. The only objection to this is that probably 99 percent of all 'pilot error' accidents could be resolved to the same conclusion.

To be of value an object lesson must deal in specifics and not generalizations. In the case cited, had the correct M.EA. been indicated on the flight log, it might be assumed that this accident would never have occurred. The request for an IFR clearance would have been initiated sooner and the copilot would probably have concentrated more on *maintaining VFR* than the supposed M.E.A. The *'lesson'* is here!

CO-CO-CO-CO

I MADE a wheels-up pass in a T-34B which was probably caused by carbon monoxide intoxication. Takeoff was at 0715 on a cold day and I had the cockpit heat on FULL. After climbout I closed the canopy and noticed gas fumes but paid no attention.

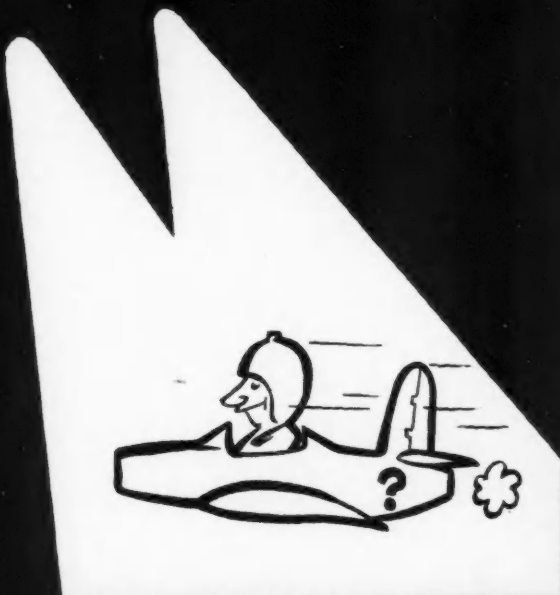
The first half hour was spent in practicing aerobatics after which I shot a few touch-and-go landings. On my fourth pass I received a waveoff from the runway duty officer by flares because of retracted gear (gear is not retracted in this pattern when making touch-and-gos).

I took the waveoff, proceeded around the field and made another landing and then left the pattern. Upon departing the field I began to feel numb and things started getting hazy so I remembered gas fumes, opened the canopy, and headed for home 20 miles away. About halfway there I starting feeling cold so I turned OFF the cockpit heat believing it would eliminate source of carbon monoxide, and then closed the canopy.

I landed after having much trouble holding constant altitude and airspeeds, and having caught myself staring at the instruments for what seemed (and probably was) minutes at a time.

My mistake was in not returning and grounding the plane as soon as I noted gas fumes.

Also, after getting hazy and numb, I passed up at least three fields on my way to home base.



UNFAIR GAME

While cruising at 10,000 feet on an IFR clearance, visibility from our R4Y-1 was clear and thirty at times. Two swept-wing jets came up on the starboard side and broke across the nose of my aircraft. Seeing as I had a VIP aboard, it certainly didn't look too good for the next couple of seconds as I demonstrated aerobatics using a Convair 340 while my passengers hung on for dear life.

Incident number two is even worse, "or which way is he gonna go now George." This time I am in an R4D going south on Victor 117 out of Daggett on an IFR flight plan in the clear. I spot a red running light off to port and down about a 1000 feet. Couple of seconds later I see he has changed course to a head-on bearing and is now in a slight climb. I turn right 30 degrees and sit fascinated as he turned the correct number of degrees to keep me bore sighted. By this time I'm climbing flat out at 90 knots. The R4D has hit the stops as far as fast getaway is concerned. I throw on both landing lights and just sit it out.

About six seconds later he slides directly under me going in the opposite direction. All I can make out is that it's a jet and the pilot is a real trusting soul.

I will go along with any program if it will promote flight survival and eliminate these situations.

QUICKIE

All hands were prepared for Admin inspection. Helicopters lined both bulkheads of the hangar. The inspection party was due at 0800.

What's this?—Sitting alongside a HUP was a very dirty looking bucket half filled with dirty rags and a mixture of AvGas and oil, obviously overlooked by the plane crew. Quick! Get rid of it! Put it in the luggage compartment for now.

The inspection went well and the following morning this mouse returned to the squadron to flight test his plane subsequent to going on a cruise. After inspecting the aircraft, I proceeded to start the engine, engage the rotors and warm up. All conditions were normal. After 0.9 hours of test flying, four autorotations and five normal landings I called for a final.

The following Monday morning the crew leader told me that he was sure glad that I hadn't flown the plane over the weekend because of the bucket in it!

Here is the point. The compartment concerned is clearly marked "Cargo Prohibited" and is the 7th item on the preflight inspection. This is where the rear transmission is located, not to mention the clutch or control cables. It was nice to learn that I was smooth enough not to upset the bucket or even to spill any of the contents, but let's face it; I *know* who was flying first pilot that day and I *know* who goofed—ME.

Overheard at Happy Hour

Did you hear about the visiting pilot who lined up his non-amphibious aircraft on the NAS Norfolk seadrome lane one night? He discovered his mistake when he called the tower to inquire about those flashing amber lights.

On the other side of Hampton Roads two jet jockeys not familiar with the Langley area made a tentative lineup on the Yorktown refinery during a low visibility situation.

Have you reported confusing optical situations in your area? Is your tower alert to these confusing possibilities?

Rescue

VA-44 and ComFAir Jax do their public relations with a *safety purpose*.

WATCH THAT JET INTAKE! LTJG Alan Bean explains to lawmen: "Stay away from the tail, the air intakes and guns. Go over the front part of the wing and work your way along it to the canopy."

"THE policeman is your friend" is a maxim that still sticks with us from grammar school days. Unless you've turned your talents to some illegal vocation you'll probably agree that most law enforcement officers spend much more of their time helping us law-abiding citizens in need of help than they do in the game of cops and robbers.

With this thought in mind, and realizing that police are very often first or early on the scene of an aircraft accident, VA-44 has taken steps to brief local state, county and municipal law enforcement officers on how best to aid one who crash-lands an airplane in their bailiwick.

What to do after opening the canopy. What directions to approach the aircraft from. How to free the pilot from his harnesses and cables. What to avoid around the ejection seat. And how to smash the canopy open if designed methods fail.

Those were some of the things brought out to better enable lawmen to cope with the task of removing an injured pilot from a cockpit in a hurry. Police officers from the Florida Highway Patrol, Duval County, and local municipalities were shown methods of cockpit entry, how to unfasten or sever harnesses, and the proven technique of cracking open a canopy by chilling it with a CO_2 fire extinguisher before hitting it.

JAMMED CANOPY? HERE'S HOW—(Below) LTJG Gene Bordone tells patrolmen there is always a marking on the side of jet aircraft pointing to the emergency handle for releasing the canopy. If this fails to work, he said, a blast from a CO_2 fire extinguisher will normally freeze the canopy where it can be kicked in with the heel of a shoe. Navy crash crewmen also showed them how to straddle the cockpit from the front when removing the pilot and the straps that must be cut or released before he can be removed.

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LAWMEN LEARN JET RESCUE PROCEDURES—(Above) State, county and city law enforcement officers of Jax undergo a two-hour course on jet aircraft rescue procedures as LTJG James Willis of VA-44 illustrates how to free a pilot from his parachute and ejection seat. Lawmen often are among the first to arrive on the scene of a crash, Willis told the off-duty lawmen: "It means a lot to us to know there will be somebody there who knows how to get us out of the plane."

SAFELY REMOVED—(Right) ENS Steve Carter plays victim in a mock rescue demonstration. Under the direction of NAS Jax Crash Crew Capt. Quentin Cantrell, crash crews quickly and expertly removed Carter from a "burning" plane.

Answers, Page 48.

1. What agency is designated to monitor and control all air traffic regardless of whether it is civil or military?

2. A flight plan can be filed containing both IFR and VFR portions. If the latter portion is IFR when will you receive your ATC clearance?

3. How are VOR and low frequency airways identified?

4. When operating at or above 29,000 feet on an IFR clearance, what '000-foot levels are normally used?

5. Flights cleared VFR/OTP may not operate between cloud levels. T____ or F____.

6. ATC clearance "via flight-planned route" does not include approval of altitudes filed in the flight plan. T____ or F____.

7. In the event that you arrive at your clearance limit without receiving either a clearance beyond, or holding instructions at this fix, you are expected to ____ ________________________.

8. Compulsory reporting points are depicted by _______ _______ in the Radio Facility Charts. Non-compulsory reporting points are shown as ________ ________.

9. On an IFR flight it is not necessary to notify ATC before changing to another frequency. T____ or F____.

truth and consequences

A DIGEST OF SIGNIFICANT AIRCRAFT ACCIDENTS

'No chance. . . hang on!'

"Let's see, that parachute we're searching for is supposed to be somewhere ahead of us . . ."

"Hmm, better climb a little. Still don't see anything . . ."

"Wow! Didn't realize the ground was rising so fast. Max power and start jets!"

" . . . Might make . . bend little to the right . . .

BACK SEAT HEADWORK— Here's a tale, taken entirely from a dispatch, of a TV-2 passenger who sized up a situation, used his head, and made an uneventful incident out of what could have been a major accident that would have involved him:

Pilot was ferrying passenger . . . enroute over Savannah passenger noticed that pilot was having difficulty flying the aircraft and with radio transmissions. He suspected hypoxia but could not communicate with the pilot because his microphone was inoperative. Passenger attempted to take control of the aircraft to descend to a lower altitude but the pilot resisted all his efforts. Passenger then passed notes to the pilot telling him that he (pilot) was hypoxic and to take corrective action. This had no effect on the pilot. Passenger then wrote a note on a RadFac telling pilot that he (passenger) was sick and to let down immediately. This had an effect on the pilot and he began a letdown.

During letdown pilot realized his difficulties and selected 100 percent oxygen and actuated his bailout bottle. Since he was not sure of his position he contacted GCI and declared an emergency. GCI vectored him to a nearby AFB. Pilot made an uneventful landing. Upon shutdown pilot still believed his passenger was sick and did not recall details of the flight from Savannah to about 10 minutes from AFB of landing (1.1 hours). Altitude over Savannah was 41,000 feet.

The cause of the pilot's hypoxia was found to be incorrect installation of the front seat which caused misalignment of fittings at the oxygen quick-disconnect and prevented pressure seal.

More briefs next page

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. bend it a

"No chance . . . hang on!"

The P2V struck the ground at the 8700-foot level about 50 feet below and 400 yards short of the crest. Airspeed was about 95 knots indicated and the altitude nearly parallel with the ground. Eight of the nine crew members survived the crash with minor injuries ●

Continued from preceding page

GOLD MINE IN THE SKY

On a Saturday morning the pilot of an AD-4B took on a 2 plus 30 local VFR flight and flew to a point just outside the local area. He then commenced to look for a friend's gold mine in a heavily wooded area. After circling the area twice he lowered the flaps and made a low pass.

The airplane was slowed to about 115 knots and the pilot began scanning the area to starboard. When he looked ahead he realized he was lower than the trees. Full power and back stick failed to prevent collision with the tops of the trees. After testing the slow flight characteristics, a landing was made at the pilot's home field.

DELAYED RECOVERY — "It is felt," said the Air Task Group Commander, "that the pre-briefed firing altitude of 3000 feet is realistic and provides an adequate safety margin. In this case, the last minute deflection correction took the aircraft through the planned firing altitude and recovery became a function of depth perception, which was reduced by atmospheric conditions and low sea state.

"That a capable, experienced aviator could become the victim of such circumstances and misjudgment is convincing evidence that continuing emphasis on the following points in dive/glide attack briefings is mandatory: (a) release altitudes are sacred and must be observed, (b) the make or break point in an attack is early in the run where precise control will result in the selection of a good initial aiming point and smooth tracking which will eliminate the need for large last minute corrections, (c) depth perception is not a consistent sense, but may vary considerably under such conditions as prevailed on the day of this accident."

An experienced aviator was witness to the accident and reported it this way: "My position was in the 5-inch gun tub forward on the port side of the carrier. The target for participating aircraft consisted of several float lights. The sea was fairly smooth and the sky condition was hazy. Upon completion of strafing runs by two FJ-3s, a division of *Cougars* started their attack.

"The leading aircraft rolled into an estimated 45-degree dive and at an altitude where I expected the pilot to begin pullout, the aircraft was seen to roll to the left as though correcting to get on target. I felt at this point that the pilot was getting dangerously low. The slight roll and correction appeared to increase the dive angle to approximately 50 degrees.

"Rockets were fired at an estimated 1000 feet and I judged pull-out was initiated at no more

than 700 feet. I did not notice whether dive brakes were IN or OUT. The aircraft rotated quickly. It was in a nearly level attitude, or at least no more than 10 degrees nose down, but was mushing badly when it hit the water and disintegrated. I felt that at least another 300 feet would have been required for pullout."

MARGINAL X-WIND — The 300-hour pilot had 8 hours in the A4D and he took off in the early afternoon to practice touch-and-go landings. At takeoff time aerology recorded the wind as southwest at 18 knots. The duty runway was 18 and the right crosswind caused some difficulty to A4D pilots taking off.

After burning down to landing weight, the young A4D pilot returned to the field and entered the pattern. "I made two touch-and-go landings and took two waveoffs," he said. "At this time I decided to make a final landing because of a very bad crosswind. The tower reported the wind as variable from 225 to 240 degrees at 15 knots, gusting to 25. This would give a crosswind from the right of 45 to 60 degrees." It is to be noted that squadron doctrine gives a maximum permissible crosswind of 15 knots at 90 degrees off the nose.

Upon touchdown the A4D commenced a ground swerve to the left and went off the runway about 1500 feet past touchdown. Flaps were not raised after touchdown as the pilot said "the crosswind encountered required stick pressure from both hands to hold in the maximum correction . . . With maximum crosswind stick and rudder correction, the right wing still tended to rise enough so that my right brake was ineffective in keeping the aircraft on the runway." The main landing gear and nosewheel settled in soft sand which resulted in shearing off the nose gear. There was no fire and no injury.

. . . the training flight took place during marginal crosswind conditions.

At the time of the accident aerology recorded a special wind reading of southwest 20 knots, gusting to 29 knots. The runway duty officer at the approach end of the duty runway reported the wind as 20 knots, gusting to 25 knots and variable from 180 to 270 degrees in gusts, however he relied upon a wind sock 2000 feet away for his wind direction.

In the board's analysis it was felt the pilot's previous preflight training and landing experience was sufficient to enable him to adequately cope with crosswind landings. Two other aircraft in the flight successfully controlled their rollouts. The board was also of the opinion that the flight took place during marginal crosswind conditions as the average wind of 45 degrees off the nose at 20 knots was considered the maximum limits for safe crosswind landings.

There was no other runway at the field which would have lessened the crosswind component and the squadron commander had circulated policy for pilots to proceed to an alternate field to avoid crosswind landings during marginal wind conditions. This was one of the board's recommendations.

TEST HOP—Before takeoff on a test hop to check autorotation rotor RPMs a HUP pilot was advised that the surface winds were 15 knots with gusts to 32. Two autorotations were made and upon the completion of the second one, the pilot brought the HUP to a hover into the wind and began a 360-degree clearing turn to the left. This turn was slow and cautious and was normal until a little past the 90-degree position of the turn.

At this time the pilot experienced a tail-high attitude as the

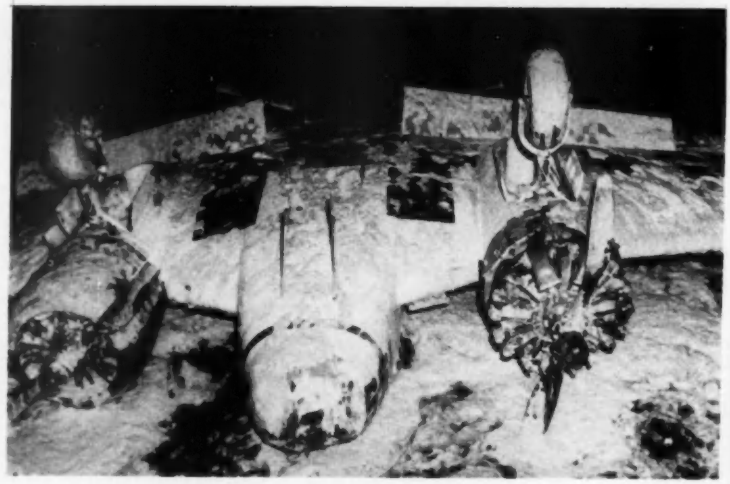
Continued from preceding page

nose continued to turn downwind. Back cyclic was ineffective in raising the nose. The pilot then applied UP collective pitch to enter forward flight downwind since it appeared his only choice was to fly out of this unusual flight condition. This attempt was unsuccessful.

The forward rotor blades struck the ground, followed by impact on the lower nose section which bounced the HUP into the air in a near level attitude. 350 feet further on, the helicopter hit again, bounced, cart-wheeled, then made final contact with the ground for strike damage. There was no fire, however the pilot sustained serious injury and was dragged away from the aircraft by the observer.

After investigation the accident board felt that no mechanical malfunction caused or contributed to the accident. Some of the flight characteristics of the HUP were discussed as follows: While accomplishing a turn on the spot in high gusty wind conditions there is a tendency of the nose to drop and the tail to rise when turning to the left past the 90-degree position from the windline.

This is primarily due to the abrupt change in the lift ratio between the two rotor systems where distributed air from the aft rotor results in a "washout" or partial loss of lift in the forward rotor when the nose of the helicopter is turned downwind. It appears that at some point in the turn on the spot, an exceptionally strong gust of wind possibly caused further loss of control to the point where full application of back cyclic would not control the aircraft attitude and position over the ground.



. . . the peculiarities of the *Beech* should be strongly emphasized during checkout, particularly in the case of single engine proficiency pilots.

WHOA HORSE—After aligning the *Beech* with the runway and locking the tailwheel, the pilot applied takeoff power to both engines simultaneously. The wind was 15 knots variable from directly down the runway to 30 degrees from the right. Pilot experience was 2400 total hours with nearly 400 hours in the SNB.

The aircraft rolled straight ahead for about 300 feet then began an easy, but progressive, turn to the right. Corrective action by the pilot was full left rudder and intermittent "tapping" of the left brake. The swerve was now a full grown groundloop and after 500 feet of ground roll the SNB went off the side of the runway at an estimated 40 knots. There was no fire and no injuries to personnel; however the aircraft was considered a strike.

The swerve to the right, said the board, was caused initially by a slight crosswind. Tire marks on the runway indicate a relatively mild initial turn which probably could have been controlled to a stop by the immediate reduction of power on both engines. Because of the relatively slow forward speed, little directional control was available through rudder action alone.

The continued application of full power rendered the intermittent use of left brake ineffective. Use of the engines to maintain directional control was not attempted and the pilot indicated a singular lack of knowledge of this means of controlling a multi-engine aircraft. He continued the use of takeoff power on both engines to a point where the turn could not be corrected and a groundloop was inevitable.

One conclusion of the board was that because the *Beech* has become somewhat disparagingly relegated to a proficiency pilots' aircraft, enough emphasis is not being given to proper checkout procedures. In practice, its peculiarities should be strongly emphasized, particularly to a single-engine pilot.

SHORT SHORTS

"The flight was routine in nature up to time of landing."

What happened? Another DFDI

OXYGEN OMISSION — At 0230 in the morning an SNB approached a military field in the midwest after a flight from the West Coast. "The copilot called the tower 10 miles south for landing," said the pilot, "and they told us to call down wind for runway 18 . . . the copilot called at the 180-degree position . . . and the tower told me I would have a crosswind from the left of 10 knots.

"I . . . corrected . . . with left wing down, right rudder. I made a smooth touchdown and immediately after touchdown experienced a violent swerve to the left. I recovered from this with right rudder and brake. I used full flaps on landing.

"I was then on the left side of the runway and experienced a second slight swerve to the left which was taken out with right rudder and brake. Then I had a third swerve to the left as the tail was coming down and I tried right brake and rudder with no effect. I then applied left throttle but at this time the airplane went off the left side of the runway and rolled about 150 feet with the yoke back in my lap trying to hold the tail down. At this point the plane tipped up on the nose and on its back."

Only the pilot sustained any injury and this was a cut forehead and bruised eye. The right engine started blazing but was extinguished with foam.

The accident board concluded that the pilot was slow in exercising cross-wind landing procedures during his landing rollout. This next sentence of the conclusion explains something of the pilot's condition on the landing. "His slow reaction," said the board, "was caused by a combination of mild hypoxia and fatigue." No oxygen was aboard the aircraft but out of the 7½ hours flight preceding the accident the last 5 hours had been at 11,000 feet.

The board noted that the minimum en route altitude for the last 400 miles was 5500 feet and since the weather was good there was no apparent reason why the flight could not have been conducted at an altitude lower than 11,000 feet.

DON'TS FOR THE AIRCRAFT ACCIDENT INVESTIGATOR

1. DON'T rely on memory—make notes as you go.
2. DON'T release wreckage until you are sure that it will not be needed for further examination.
3. DON'T decide that you are unable to establish the cause of an accident until you are quite sure you have considered all relevant aspects of the available evidence, and that you have all the evidence that is available.
4. DON'T jump to a conclusion as to the cause of an accident—vital evidence is often lost through investigators trying to take short cuts.
5. DON'T dismantle any components of the aircraft without inscribing reassembly marks on them. This applies also to cutting spars, struts, wires, etc. that you may need to examine later—always mark them first.
6. DON'T have small components dismantled on a dirty surface, have some clean material laid under them.
7. DON'T put two fractured surfaces together so that they touch, if there is any likelihood of their having to be micro-examined—keep such fractures protected by wrapping.
8. DON'T let it be thought that the purpose of the investigation is to apportion blame, make your status clear.
9. DON'T look for only one cause. Most accidents are due to a number of factors, each contributing something to the mishap. These factors should all be stated so that they may be analyzed and form the basis of all subsequent action to provide remedies.—*2nd MAW*

1 YR AGO THIS ISSUE

2 YRS AGO THIS ISSUE

3 YRS AGO THIS ISSUE

Many of these articles are as valid in accident prevention today as when they were originally published. Refer to your Safety Officer's or Flight Surgeon's files. Reprints or extra copies may be obtained by writing APPROACH, NASC, Norfolk 11, Va.

EARNING THEIR KEEP?

BOX SCORE

Wheels-up landing, unintentional, pilot induced

June 1957	3
June 1958	1

280 Wheels-up Landing Saves Reported in 20 Months

Wheels-Up Saves

Counting those listed on the bottom of this page, 280 wheels-up landings have been reported "saved" since November 1956 when APPROACH began recognizing people who have contributed to a save.

Wheels watches were ordered posted on duty runways during flight ops by OpNav Instruction 3750.7A dated Oct 1956. A recap of wheels-up landings before and after issuance of the order is as follows:

Wheels-up landings, pilot-induced, unintentional occurring in 1956	73
Wheels-up landings, pilot-induced, unintentional occurring in 1957 (first full year in wheels-watches were required)	39
Wheels-up landings, pilot-induced, unintentional occurring in 1958 (thru 28 May)	10

Note that *half* as many wheels-up landings occurred in 1957 as compared to 1956. While this reduction is significant, it does not accurately reflect the full potential effectiveness of wheels watches. Because the OpNav Instruction did not set a compliance date, and permitted considerable latitude in devising suitable warning equipment, many commands implemented the instruction at their discretion.

The records show that in the majority of the 39 accidents/incidents which occurred in 1957, *no wheels watches were posted.*

If the rate so far during 1958 is any indication there should be fewer wheels-up accidents this year—IF, wheels watches are posted at every installation.

With the aid of improved techniques, use of standardized equipment, and proper indoctrination of wheels watch personnel, unintentional wheels-up landings should be practically eliminated.

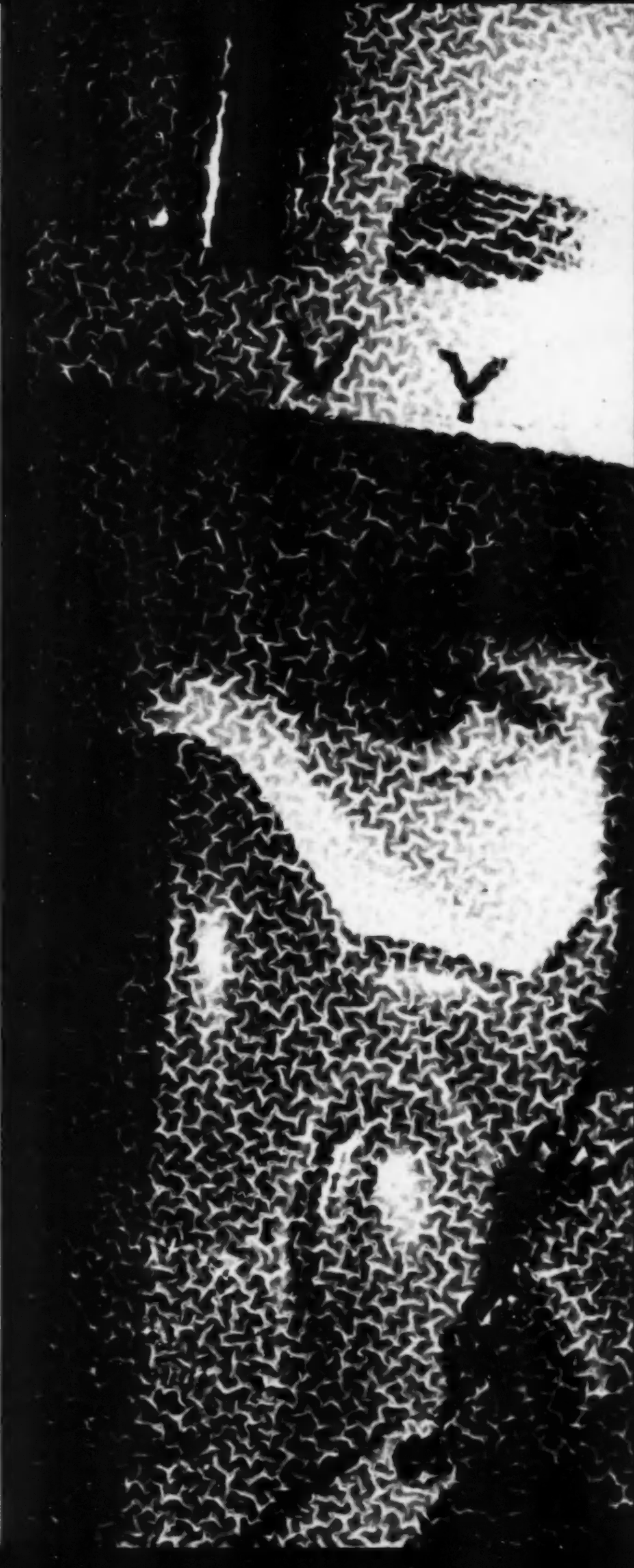
Judging by the number of wheels-up "saves" reported it would appear we would have had a bumper crop of wheels-up landings had not wheels watches been posted. By cranking in the factor that a large number of wheels-up approaches are perhaps also discovered by the pilot before landing because things just didn't "feel" right, the figure becomes more realistic.

A complete list of wheels-up landings by model and year is available on request from APPROACH.

CURRENT REPORTS

Name	Station	Acft	Date
REILLY, M. V., AC2	NAS Moffett	F9F-8	5/9/58
JOHNSON, T. L., AB3	NAAS Whiting	T-34B	4/18/58
STAGNER, W. D., AN	NAAS Whiting	T-34	4/22/58
BARFIELD, W. E., AN STEPANOVICH, D. F., AA	NAAS Whiting	T-28	4/10/58
BOX, F. R., ACTAN	NAAS Kingsville	F9F-5	unreported
JASMIN, F. L., AC3	NAS Norfolk	AD-5N	4/11.58
BORES, J. R., AN	NAS Glynco	F2H-2	2/20/58
KREPS, F. W., HM1 SHAUVER, C. L., AL1	NAS Glynco	F2H-2	4/29/58

Name	Station	Acft	Date
SCHRENKER, R. A., SN	NAAS Whiting	T-28	5/2/58
SPAIN, A. R., AA	NAAS Whiting	T-28	5/2/58
STEPANOVICH, D. F., AA HERNANDEZ, M. AN	NAAS Whiting	T-28	5/5/58
DUARTE, J. F., AN STEPANOVICH, D. F., AA	NAAS Whiting	T-28	5/5/58
DUARTE, J. F., AN) GAY, C. A., AN)	NAAS Whiting	T-28	5/8/58
CARSON, G. B., AN	NAAS Whiting	T-28	5/26/58
LIKENS, M. R., AN) GAY, C. A., AN)	NAAS Whiting	T-28	5/26/58



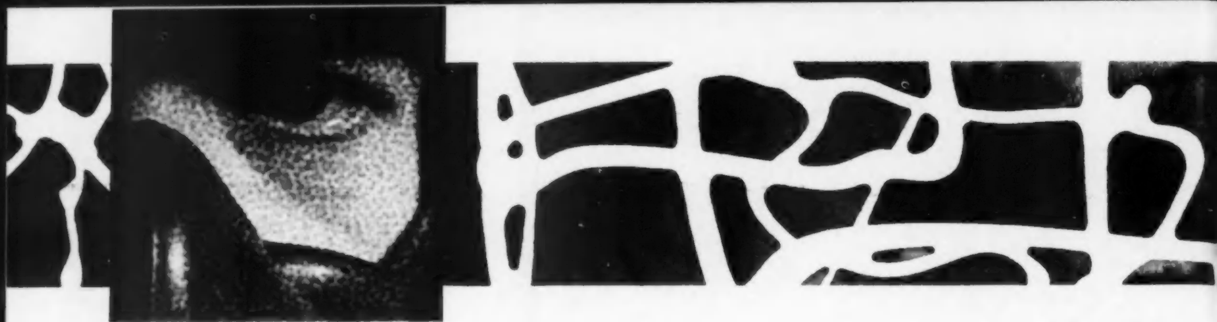
'THE MORE YOU KNOW....'

AS THE skipper slowly passed down the line of neat, blue uniforms, with a pause and an extra glance here and there, a man just a few paces down the line wobbled a bit and pitched forward onto the concrete . . .

You've probably seen more than one man pass out during an inspection. In fact, maybe you even felt a bit dizzy yourself while waiting for the old man to pass by so you could squirm at attention a bit.

You can feel that way from a number of causes besides inspections—like getting beaned with a baseball, or standing too long with one foot on a brass rail. Normally such momentary spells are passed off without mishap and are forgotten.

When the same thing occurs to a pilot in flight though, the consequences can be serious — to himself and to others. An unknown number of "undetermined" fatal aircraft accidents can almost surely be attributed to brief, partial loss of consciousness. Flight surgeons have been studying fainting and partial loss of consciousness for years, hampered largely by the fact that the majority of such cases are very probably passed off and forgotten by the "victim." But from their knowledge of the body and its functions and



reactions, they can help you to know what can cause you to keel over at inspection, at the brass rail, or at 30,000 feet.

Well, what does cause a "common" faint in a normal, healthy person?

You can create such a faint anytime, anywhere, with an old college prank. If a normal person breathes deeply about 20 times while squatted down and then rapidly stands up, closes his windpipe, and attempts to expel air (thereby increasing pressure within his chest) he will very probably pass out cold. Wait! Before you try such a stunt you'd better have some strong buddies handy—you'll lose muscular control and keel right over against that pile of maintenance work orders. Don't do it alone, please.

. . . well, how do you feel now? Just sit right there for a bit, you're all right. Did you notice the short period of convulsive movement as you were coming around? That's standard. It took a few seconds before you realized where you were and what was going on, didn't it? Yes, that's normal too.

Now, are you wondering how anyone would perform this same stunt in a cockpit? Well, it's very easy. We'll tell you how, but in order to understand it, let's see why you fainted right here in the readyroom.

Medical study of the fainting trick has shown that it results from hyperventilation (overbreathing) and g-forces brought about by the posture change and by interference with the blood circulation.

You're already aware that the flow of blood to the brain is reduced by positive g-forces; that's why you wear the fancy nylon corset—to keep the g's from draining your brain of blood.

And your rapid, deep breathing caused your body system to become alkaline due to insufficient carbon dioxide (that's right —too much CO_2 can knock you out, but so can insufficient CO_2; some hospitals administer a mixture of oxygen and CO_2 under certain conditions to stimulate heart action). Signs of hyperventilation are tingling of the fingers and toes and muscle spasms (twitching). What's actually happening is a narrowing of the blood vessels in the brain. Hyperventilation can be brought about by anxiety or by a leaking mask inhalation valve.

So, you fainted because your brain's blood supply couldn't meet the demand. What's the blood do for the brain? Carries fuel to the brain, of course. The fuel? Oxygen and blood sugar. So actually you could pass out even if your brain did get enough blood, if that blood didn't contain enough fuel. The oxygen part of the fuel comes from your mask—or from the atmosphere when you're not using a mask. And the blood sugar comes from food — real, wholesome, well-balanced meals at the right times (see "E is for Eating" in Feb. 1958 APPROACH).

Now we're about ready to see how this fraternity stunt will go to work on you, unintentionally, in the cockpit. Unless you've made a gunnery run or a loft run so many times that you're blase about it, you're quite likely to be a little bit apprehensive — and apprehensiveness leads to overbreathing (hyperventilation). Somewhere in the maneuver you're going to pull a g or two, and lo, there you have the same situation that was mentioned in talking about the squat and breathe stunt. You're overbreathing, the g-forces are attempting to drain blood from your brain, and there's increased pressure on your chest. And out you go. But there's no one around to take over and keep you out of trouble.

Are anxiety and g the only ways your brain can be deprived of blood so as to bring about dizziness or fainting? No! There are other things that can do it alone, or in combination with

just a little overbreathing or just a little g.

Excessive heat can reduce your brain's blood supply too. The blood vessels near the surface of your skin become dilated (enlarged) when you're hot, and also you lose body fluid and salt through perspiration. One flight surgeon tells of waiting 25 to 30 minutes in an A3D before a flight on a 90-degree day; the inside thermometer pegged at 120 and the FS became faint and nauseated. After recovering he advised us all to drink water, take salt tablets as prescribed by your flight surgeon, and keep as cool as possible. He also said that hardhats help by reflecting away direct sunlight and by insulating. Said "no comment" when asked if the hardhat didn't also keep the head good and warm by its insulation, like a closed oven.

Aero-medical researchers have also found that certain frequencies of flickering light could cause fainting in some people. The Germans knew about this in WWII, and rigged searchlights to flicker at about 12 cps. Only cure is to look 'tother way.

Another thing that reduces blood supply to the brain, and that you have a good amount of control over, is your physical fitness. You can't control all the factors causing poor physical fitness of course, like influenza, excessive coughing (increases chest pressure) or sweating caused by fever, but you don't fly when you're that ill. Prolonged fatigue is a factor you *can* govern though, and so are (ugh) hangovers. Inadequate rest can accelerate the effects of some of the other faint-causers, so get as much sleep as you (should) know you need. And as for hangovers — well, what do YOU think? Tired of hearing it? So is your flight surgeon, but it's still a necessary part of his vocabulary.

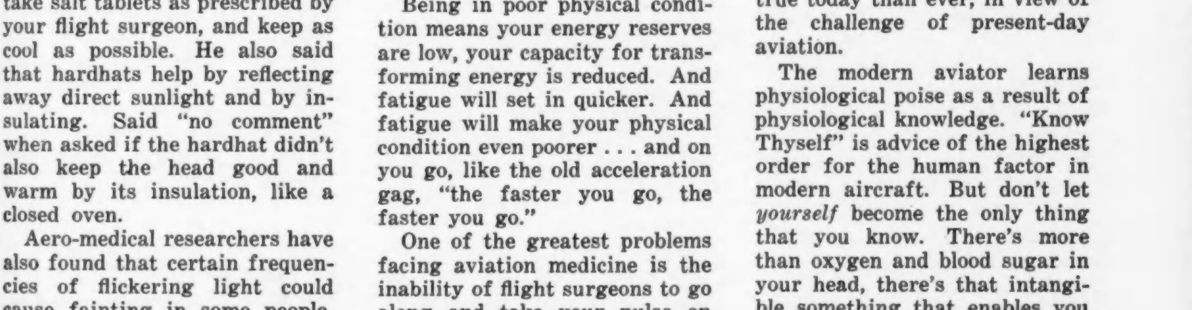
Being in poor physical condition means your energy reserves are low, your capacity for transforming energy is reduced. And fatigue will set in quicker. And fatigue will make your physical condition even poorer . . . and on you go, like the old acceleration gag, "the faster you go, the faster you go."

One of the greatest problems facing aviation medicine is the inability of flight surgeons to go along and take your pulse on each and every hop. They have to depend on you to a very large extent. And, just like your AIO tells you, you can't consider yourself a qualified judge of what is important and what isn't, so it's best to report it and let your F. S. determine whether your information is significant. It can very well be significant enough to save your life.

Yes, medical information has to be passed out and, to a certain extent, self-applied. The human body functions in a truly wonderful manner, and when it fails it's never due to a Murphy or design, it's most often due to maintenance, improper or lack of. To obtain optimum efficiency from the body requires knowledge and care, not only on the part of maintenance people (F. S.) but also by the operator and owner (*you*). This is more true today than ever, in view of the challenge of present-day aviation.

The modern aviator learns physiological poise as a result of physiological knowledge. "Know Thyself" is advice of the highest order for the human factor in modern aircraft. But don't let *yourself* become the only thing that you know. There's more than oxygen and blood sugar in your head, there's that intangible something that enables you to sense, think, interpret, and act better when you know what's going on inside you. Like that old acceleration gag again, "the more you know, the more you know."

Based in part on material from "Physiological Near Miss," by G/C W. R. Franks, RCAF "Flight Comment."



NOTES FROM YOUR flight surgeon

Tranquilizers

MANUAL of the Medical Department, Chapter 14, article 14-6(5) states: "The physical well-being of flying personnel is a prime responsibility of the flight surgeon and he shall make every effort to insure that all flying personnel are physically and psychologically fit prior to flight."

Pilots should not fly in actual control of aircraft while taking drugs, including ataractics (tranquilizers), which might affect their physical or mental state *adversely*. If drugs are administered which have effects that are considered hazardous in the performance of flight duties the pilots should be grounded until the pharmacologic effects of the drugs have subsided.

In support of the above, pilots should be frequently alerted to the inherent danger in self-medication of any type which is not supervised by the flight surgeon.

Wall of Grey Water

BRINGING in an FJ-3, the pilot reports his engine flamed out in the landing approach just past the 180. "My altitude was about 800 feet and . . . I decided not to eject but rather to ditch the aircraft. On impact there was only one jolt and from then on I was just a passenger watching a wall of grey water . . . Dilbert Dunker flashed through my mind . . . When the spray settled and I could see what was going on, the plane was level, right side up with water about a foot from the cockpit gunwales.

"Missing the seat belt release on the first try I felt around in the water until I got it opened and stood up." He stepped into the water, pulled the right toggle of his life vest. His chute had opened. He got out of the harness with a little difficulty, but the chute was sinking and his foot was caught in the lines. The plane had nosed down and was sinking slowly, pulling him down with it. The left side of his vest wouldn't inflate.

Trying to disentangle his foot and to inflate his vest with the oral inflation tube at the same time, the pilot was having no success with either. He cut the shroud lines, oxygen mask strap, and bailout bottle hose, but the life raft was still pulling him under. After several attempts to follow this down and find the release he cut this too, and was rescued by boat, although one flare had failed.

He handled several difficult situations well, and the only suggestions which could be made to him was that all pilots should check life vests before flight.

Be Familiar

THIS PILOT, with 20 hours in model F8U-1, touched down 75 feet short, shearing the landing gear on the 6-inch runway lip. The aircraft skidded 6500 feet down the runway, catching fire, finally veering off runway.

The pilot was not injured. He found difficulty in locating and activating the four release devices on the integrated torso harness to leave the aircraft. In his haste he didn't cut the engine.

F. S. Recommends:

Instruction and practice in the quick location and use of harness releases would help preclude confusion such as occurred during this pilot's haste and excitement.

Emphasis should be given the

It is regretable that statements about a pilot's emotional instability or lack of general aeronautical ability are most frequently heard after the pilot has had a fatal accident. All pilots should be impressed with the fact that they should always make known any deficiency in a pilot to their senior officers as soon as it becomes apparent. The commanding officer must carefully consider whether a recommendation for a transfer or disposition board is appropriate. If the deficiency involves emotional instability or general lack of aeronautical ability, a transfer to any other type squadron is definitely not the proper course of action.—from an AAR endorsement.

importance of cutting the engine on all aircraft prior to alighting following a crash.

Nobody Told Him?

DURING takeoff, the A4D pilot experienced a sudden vibration and power loss, 4,000 feet down an 8,000-foot runway at his home field. On the first try his hand slipped off the hook handle, but he got her down on the second attempt. However, this runway had no abort gear, and he went off the end of the runway, into a marsh where the nosewheel collapsed and the canopy was covered with mud and water.

He opened the canopy manually, reached for the left shoulder strap rocket jet release, fouled his hand on radio and oxygen cords, grabbed his helmet off and threw it out, released all rocket jets except for difficulty with the right seat belt release, which finally opened after several seconds. Then he climbed out uninjured. Fortunately there was no fire or the time taken to get out could have been serious.

He had failed to utilize the A4D's pilot release handle, which would have freed him from the aircraft.

If You Hope to Float

WORDS TO the wise, or not-yet wise, on the Mk-2. This discussion arises because of a pilot who almost drowned—would have if he had been unconscious. The fault was not in the design of the vest but in the fact that it was not worn properly.

Following a cold cat shot the *Banshee* went into the water in a partially controlled crash.

His only complaint about survival equipment was that after inflating his Mk-2 life vest he still had a struggle to keep his mouth above the water — that salt water his flight surgeon had advised him not to drink.

After rescue he went in the NAS training pool wearing flight suit and life vest to make a test.

It was found that proper performance of the vest depends on three things:

1. No leaks!
2. Adequate inflation by both CO_2 bottles.
3. Proper fitting of harness to body build. (Straps should be tight enough so that you can just get your hand under the belt.)

When these conditions are met, the pilot's mouth is well out of the water and he floats on his back.

So, to make sure the vest will work properly, check it frequently for chafing, *check the CO_2 bottles before each flight,* and keep the vest straps correctly adjusted.

For more info see ACSEB 9-54.

Vertigo Again

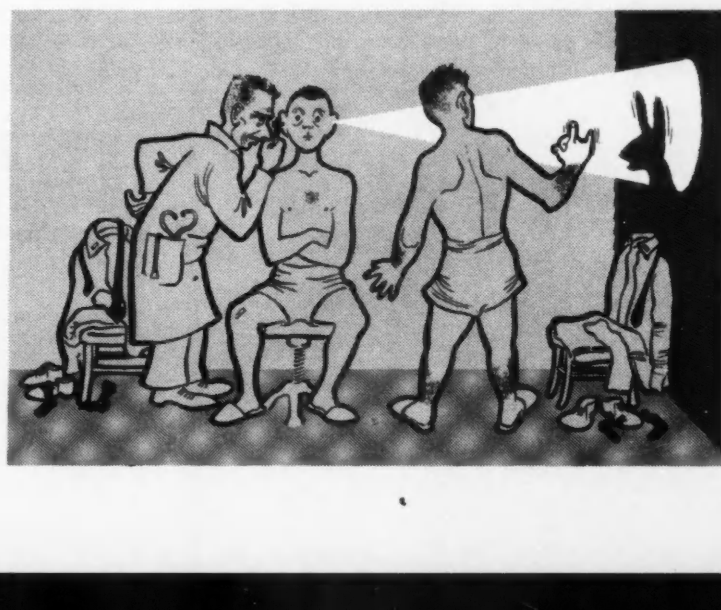
AS I let down, turning into the break for a night carrier landing, I set up the cockpit: hook down, gear down; prop forward; mixture rich, switched inverters—at the same time trying to locate two other aircraft in the pattern, and watch the carrier. I was on and off instruments the entire time. There was no horizon and the visibility was very poor. About halfway down, I felt as if I was going into a right bank and over on my back.

I knew this was vertigo and went immediately to instruments. The altimeter was about 600'. I leveled my wings, pulled my nose up and the last thing I saw was the horizon indicator and horizon bar, indicating I was level and flat.

When I came to—after the impact, I saw water about eye-level on my windscreen. I opened the canopy and seat belt and climbed out and swam away before the plane sank. I was picked up by the destroyer."

This pilot has experienced vertigo in the past but by immediately going on instruments he has always been able to overcome it and has never had any close calls because of it. However, it seems that this time was the exception.

Then the pilots would have a good indoctrination as to the sensation and methods needed to cope with it. In the meantime more emphasis through literature and briefing sessions about the causative factors of vertigo and the pilot's methods of coping with it is recommended. Experiencing vertigo produced in a simulator Link such a trainer can be advantageous to pilots, especially new pilots.



Some accidents, and many hairy incidents are caused by stray tools, parts and just plain "Crud" being adrift in aircraft. Typical of many of these reports is the general defending statement *"this is considered to be an*

ISOLATED

THERE is a definite increase in the number of accidents in which tools and other foreign objects are found in the wreckage. But, as one endorser of an AAR wrote, "In many instances it is difficult to determine if such objects were the cause of the accidents. However, the fact that loose gear is found is indicative that maintenance personnel are not aware of the serious consequences of lost tools." Unfortunately, the endorser seems pretty much right.

As an example of such an accident take the fatal case of the F9F-5 just out of check, and on a rocket-bombing flight. Full recovery was not made from a run on its target and the aircraft struck

NO DIRECTIVES,
NO INSPECTION PROCEDURES
NO WARNING TAGS,
CAN EVER TAKE THE PLACE OF
THOROUGH AND COMPLETE
MAINTENANCE, INSPECTION, AND SUPERVISION!

U. S. Coast Guard Flight Safety Bulletin

the ground in an upright flat attitude, and then exploded.

Cause of the accident was not conclusive, due to the explosive forces which destroyed the aircraft on impact. But the unexplained presence of a screwdriver handle (photo upper right) found in the wreckage and considerable other evidence led the aircraft accident board to believe that jamming of the elevator controls by the screwdriver was the *most probable cause.*

Man Upstairs

In this next case the consequences were not as severe, thanks to the "Man upstairs." The discovery of control difficulty was made during a less critical maneuver, and the skill of a professional type, brought home the airplane as well as the evidence.

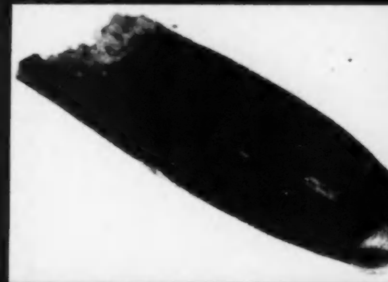
Immediately after becoming airborne, the pilot of an FJ-2 noted a definite stress in the aileron controls. This stiffness became progressively worse during the flight, and the pilot commenced a flameout type approach, reporting initial at 5000 feet. At 2400 feet, and the abeam position (landing

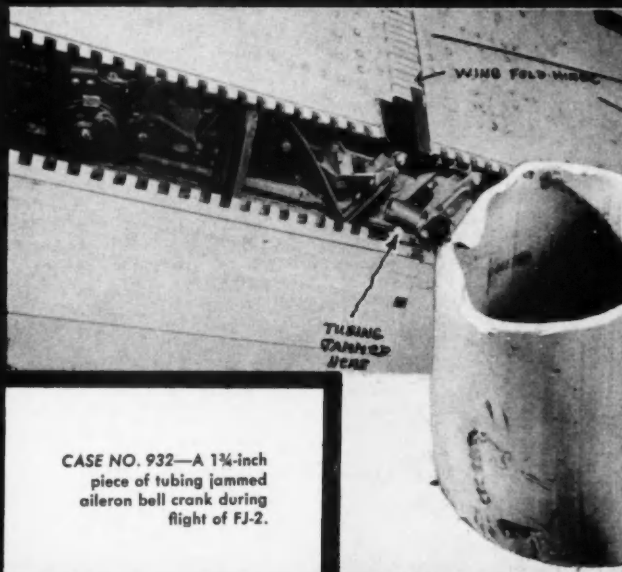
CASE

configuration), the aileron pressure suddenly responded normally for approximately three or four seconds. Shortly thereafter, the pilot attempted to raise the left wing, and encountered an abrupt stop in stick movement to the right. The stick would move about one inch past center and then stop.

Continued next page

CASE NO. 580—Broken Screwdriver handle found in wreckage of F9F. See Case 607 for picture of similar screwdriver.

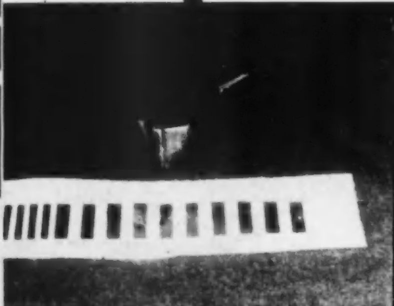




CASE NO. 932—A 1¾-inch piece of tubing jammed aileron bell crank during flight of FJ-2.

CASE NO. 857—Gear found in left-hand expended ammo compartment of FJ-3.

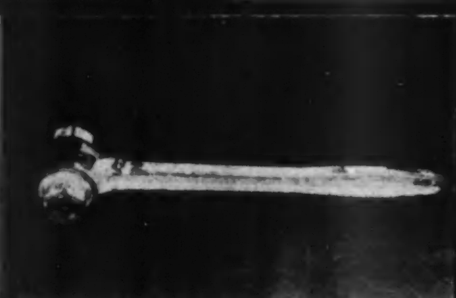
CASE NO. 120—Ratchet found in ammo compartment of FJ-3.



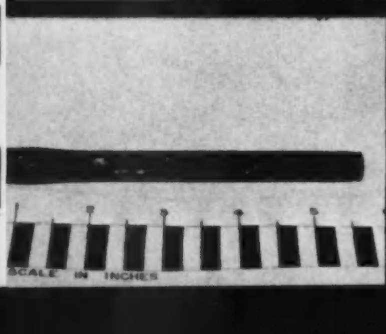
CASE NO. 793—Bucking bar found in right-hand side of hell hole, below ARC-27 mounting rack in FJ-3.

SE NO. 828—Wrench ound adrift in the oxy- compartment of FJ-3.

CASE NO. 686—Screws found in TV-2 after overhaul.



E NO. 155—Wrench found in tail section of FJ-4.



CASE NO. 908—Cold Chisel found in hell hole of FJ-3.

Continued from preceding page

The pilot leveled wings with the rudder and what aileron control he had, then added power and climbed to 15,000 feet. He tested characteristics at altitude, weighing all factors, and decided a landing would be possible at 150 knots airspeed, with the use of the rudder and by making gentle turns.

A shallow descending turn was made and the pilot lined up with the runway at 3000 feet. During a constant power-on descent, he maintained alignment by rudder and limited stick control. Touchdown was made 1000 feet down the runway at 150 knots airspeed, hook extended. The hook was raised during rollout, when it became evident that it would not be needed.

An investigation was made immediately after the flight, and the L.H. wing leading edge was dropped revealing a 1-3/4-inch piece of aluminum tubing (see Case 932) jammed between the outboard fold aileron bell crank assembly and the nut on the second phillips head screw, outboard of the wing fold, which secures the forward most stringer of the outboard section.

Either the tubing had inadvertently been left in the leading edge at some activity, or had been introduced by someone when the wings were in a folded condition.

The FLIGA report called this one an isolated case.

Other 'Isolated' Cases

An R6D's aileron controls jammed during flight. A safe landing was made using rudder controls. A piece of 5/8-inch plywood 13″ by 4″, painted red and stenciled "R6D" was found jammed between the port aileron torque tube pulley and station 69. It is believed that the board was a jig used for rigging of the control system during overhaul. The squadron said the report was submitted for information although it considered this to be an *isolated case.*

Noted in Passing

A chief aviation boatswain mate, who has spent a good portion of a 3-year tour aboard a carrier in its arresting gear catwalks, reports he observed many landings in which tools came flying out the wheelwells of aircraft. He has retrieved enough to fill a tool box.

Of Washers and Things

The First Marine Air Wing reports an FJ-4 pilot suddenly found his flaps had lowered during a turn, flap handle was still UP, but the accelerometer showed 8.4 G had been imposed.

A 5/16″ washer had lodged across the terminals of the flap control relay, completing the "flaps down" circuit. The washer didn't come loose from anything, it was just part of the all too usual trash that lies in aircraft bilges because *many people don't recognize the danger of loose small articles in aircraft!*

How many metallic things can you think of that are as small as a washer—a small washer, the kind you find many of on an airplane; screws, nuts, wiring terminal, drops of solder, even the metal foil from a cigaret pack?

Loose tools and leftover or discarded parts have no place in aircraft.

Don't Forget the Water

Water, too, should be considered as a foreign object.

A number of recent reports of flight controls freezing in flight were caused by accumulated water in the control mechanisms and areas surrounding controls. Two F9F-6 accidents were caused by frozen controls. An FJ-4 accident was believed caused by controls jammed due to ice formation under the cockpit deck. Other incidents involved restricted control movements in S2F, A3D, A4D, F3H, and TV. Potential for this type situation is greatest when water is collected from rains, washing and condensation, and is not removed prior to flight in which low temperatures are encountered.

Take precautions to prevent water entry into aircraft. Just as important is carrying out drainage instructions, particularly after rains. For your model aircraft, see the applicable HMI.

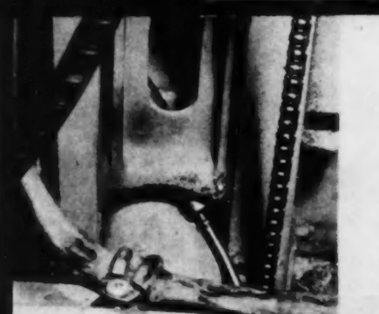
Is Your System Good Enough?

Generally speaking, mechanics, plane captains, aircrewmen and pilots are careful people. But every now and then they slip up. Take the case of the pilot who noticed a loose clamp in the baggage compartment while he stowed his luggage. He did nothing about it. Shortly after takeoff he found his elevator control jammed in a nose-up

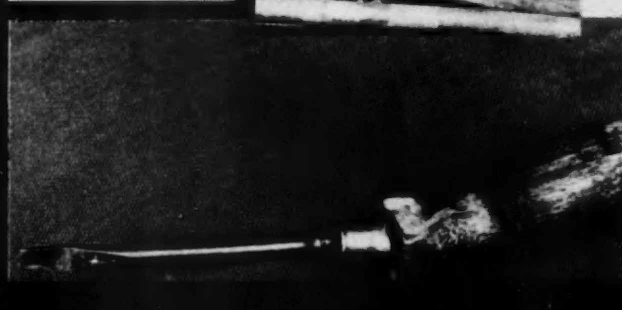
CASE NO. 526—Three cans of oil found in ra[d] compartment hell hole.

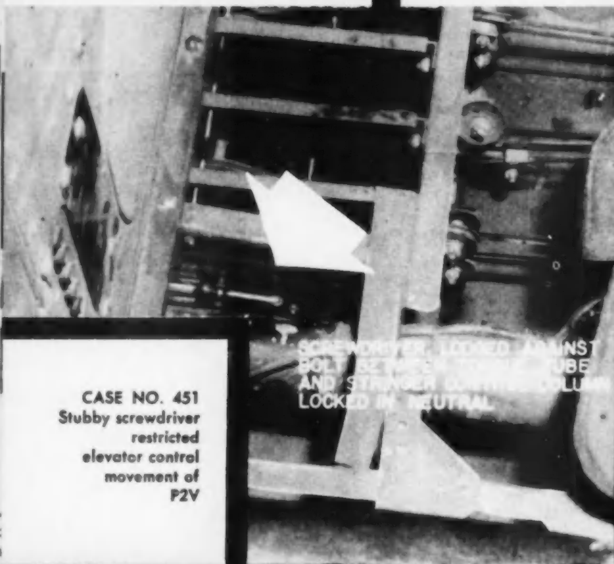
CASE NO. 767— Wrench, nuts, washers and bolt found in TV-2 following overhaul.

CASE NO. 607—Screw driver found in the left hand side of the hell h[ole] area aft of the stabiliz[er] tension regulator in FJ[-4]



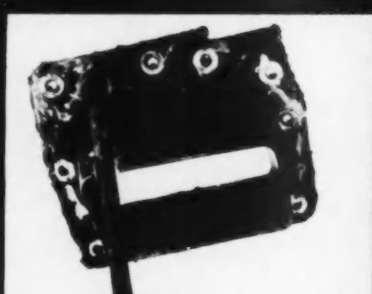
CASE NO. 810— Screwdriver below caused unusually stiff aileron movement in TV-2 during flight.





CASE NO. 451
Stubby screwdriver restricted elevator control movement of P2V

CASE NO. 748**—**
Contaminated Hd-draulic fluid and debris discovered on acceptance check following overhaul of TV-2.



CASE NO. 977**—**
Wrench in TV-2 shorted out electrical system upon contacting terminal.

Continued from preceding page

attitude. The aircraft crashed as he tried to level off by reducing power but he managed to survive.

Investigation showed the clamp had become wedged between the elevator control bell crank and a vertical support in the tail section.

In the case of the F9F earlier in this article, the AAR noted that the squadron uses a team of special inspectors to go over airplanes just out of check to make sure that all systems and controls are operating properly. The history of this airplane showed that it had a 120-hour check this particular morning and the team of inspectors had checked the systems for operation and control, reporting NO discrepancies of any kind. No mention was made as to whether an inspection for foreign objects had been made. Note: NavAer 01-1A-500, Handbook of Aircraft Maintenance Cleaning, requires Inspection Forms to include cleanliness of aircraft, its components, accessories and equipage as inspection items. These forms include preflight, postflight, intermediate, major, preservation, acceptance, etc.

It *Can* Happen Again

The inference from these "isolated cases" is that this kind of thing can only happen once. There's no such thing as an "isolated case." *If it happened once, it can happen again, and again.* Perhaps the exact same circumstances may never be combined again, but you can bet your bottom buck the end results will be the same.

What can you do to help eliminate this type of accident?

The following should help:

► Remember first that an aircraft is most vulnerable after maintenance and service checks.

► Second, that trouble usually comes from where you don't look.

► Inspect thoroughly for tools, parts and other hardware which may be adrift.

► Vacuum* out all residue and other foreign materials after maintenance.

► Be meticulous as a surgeon, use a checklist—inventory your tools, parts and other equipment after each job.

► Make sure the inventory is accurate. If a shortage is noted this is reason for a thorough inspection of the aircraft involved. Otherwise you may be setting the scene for a major accident.

► Learn to associate tools with the jobs on which they're used—if any are missing you are more likely to locate them.

► Clean your airplane.

► Keep it clean.

*** Heavy and light duty type vacuum cleaners available for cleaning interiors of aircraft are listed in NavAer 01-1A-506.**

Whether a pilot taxis onto a lowered elevator, as in this case, or there's a lack of coordination between plane directors and respot crews, as noted below, the end result is lots of work, lots of embarrassment and less combat readiness.

Selected Forced Landings,
Incidents,
Ground Accidents,
Notes and Comments on
Aircraft Accidents

FROM THE GROUND UP

MISTAKEN SIGNAL—During hangar deck respotting, No. 1 elevator lowered, helicopter was moved and parked, facing aft, on elevator. FJ-3 aircraft was then moved onto the elevator, tail first. Plane director, realizing FJ-3 was not going to clear helicopter, signaled FJ-3 plane captain to stop his aircraft by blowing whistle. Although signal was sounded when FJ-3 was one foot or more from helicopter, the FJ-3 failed to stop until after striking lower plexiglass panel of cockpit enclosure with its elevator control surface.

Cause: Failure of FJ-3 plane captain to stop his aircraft when signaled. Plane captain stated signal sounded faint and thought it was from some other area.

Corrective Action: 1. *Reinstructed plane captain to apply brakes whenever a signal is heard no matter how faint or distant it may sound.*

2. Recommend spotting helicopter in an area which would require a minimum of movement during hangar bay respotting.

More on next page

Continued from preceding page

QUOTABLE . . . .

"The dangerous aspects of inflicting damage to an aircraft and deliberately withholding this information are self-evident. It becomes apparent that the solution to a problem of this type lies within the field of human relations as it applies to personal honesty and integrity on the part of the individual. It is felt that the only solution to unreported damage accidents is one of attempting to impress upon all persons the vital importance of not withholding information of this type. It is also recognized that no amount of indoctrination will overcome the reluctance to admit to such acts on the part of individuals possessing low standards of devotion to duty and honesty to self."—*FLIGA*

NEAR WHEELS-UP—At the 180-degree position, the pilot of an F9F-6 reported gear down. He saw the wheels watch wave the flags, then disappear. The pilot continued his approach, but just prior to touch-down realized his gear was up and added full power. The tips of the speed brakes and inner flaps scraped the runway. He did not see a flare.

After giving the standard LSO wave-off, and observing the aircraft continuing the approach, the wheels watch ran back to the crash pick-up to get the flare gun. This delay apparently caused the flare to pass behind the approaching plane.

It was recommended that all wheels watch standers be indoctrinated on the use of the flare gun. All pilots will be instructed to comply with the recommendations of CNARestra Instruction 3750.21D which recommends that pilots leave the traffic pattern and re-enter, using the check-off-list, after a wave-off if the gear is retracted.

The command concerned in this incident is studying a remote control multiple flare system of local design to aid in preventing incidents of this nature.

—Please Wheels Saves, page 30.—Ed.

ENGINE INSTALLATION INSTRUCTIONS—During a catapult shot the throttle of an F3H-2N was forced aft to the idle detent from the military position. With difficulty, the pilot was able to force the throttle back to military and then to afterburner and became airborne. This was the pilot's first catapult shot and he attributed the trouble to the force of the H-8 catapult.

After turning downwind, the pilot had a DC generator failure. He notified the ship and was directed to return to shore base. The remainder of the flight was routine. After landing, the engine could not be secured with normal procedures and had to be shut down by using the fuel master switch.

Investigation revealed that the engine had shifted aft approximately three inches on the launch. The engine forward mount T-bolt, Part No. 25-50113-3, had rotated 90 degrees during engine installation, resulting in improper engagement with the engine forward mount clamp, Part No. 25-50059.3. Rotation was due to the missing roll pin, Part No. 79-28135-1000. Engine movement aft caused the port and starboard removable air ducts to partially disconnect. The forward strap on the port duct was drawn into the engine and the DC generator leads became disconnected, causing failure. The afterburner fuel inlet line was stretched to the limit and the main fuel line was kinked.

The primary cause of this accident is the lack of adequate technical instructions. Engine installation instructions make no mention of the possibility that the T-bolt can rotate during engine installation, nor do they point out the need for inspection of the forward mount after engine installation.

Maintenance personnel is assigned secondary cause.

Recommendations:

1. Engine installation instructions be issued immediately to the effect that it is possible for the T-bolt to rotate, and inspection of the forward mount should be made after each engine installation through doors 31R and 31L.

2. The contractor investigate a redesign of the T-bolt to prevent rotation even though the roll pin shears or becomes lost.

INSPECTION AND TEST—Immediately after becoming airborne on a scheduled test flight, the pilot of an FJ-4 experienced a loss of power and observed a fire warning light to illuminate. He transmitted his intentions to abort the takeoff, moved the fuel control lever to OFF, switched the engine master and battery switches OFF, opened the speed brakes, and made a wheels-up, flaps-up landing on the last third of the runway.

The pilot abandoned the aircraft uninjured, and the aircraft received overhaul damage.

The accident board concluded that:

a. The primary cause of this accident was due to maintenance error since the aft fuel boost pump outlet line bolt (Part No. AN76A41) was not properly torqued and safety wired.

COTTER PIN INSTALLATION—During turn up of an A4D-1 the pilot discovered that the aft control stick movement was restricted to approximately four inches aft of neutral.

The tail of the cotter pin holding takeup spring Part No. 128, Illustrated Parts Book item 14, fig. 140, to the cable assembly elevator nose down aft right hand, item 20, fig. 140, cut through the phenolic tube Part No. 5442528-9, item 16, fig. 140. The HMI AN 01-40AVA-2 page 2-127, fig. 2-36 shows details of installation.

It was recommended that the excess pin tail be cut off and filed smooth to prevent contact with the tube surface.

TOO MANY TURNS—Excessive heat was noted in the tail section of an FJ4-B prior to takeoff. The Marmon clamp had loosened, allowing the tailpipe to slip down 4 inches from its normal position. This permitted entry of exhaust gases into the tail section of the aircraft.

Investigation showed the safety-wire on the port side of the Marmon clamp had broken allowing the clamp bolt to unscrew. The safety-wire on the starboard side was also broken. The safety-wire failure was possibly due to stress concentration induced by *too many turns per unit* length near the head of the Marmon clamp bolt.

Recommendations were: (a) Daily inspection of safety wire. (b) Insure that the tailpipe dowel pin matches the recess on the exhaust cone flange upon installation. (c) Do not use excessive tension when safety-wiring clamp bolt.

MAINTENANCE—The word *maintenance* by itself is a simple description of general performance. But perhaps we should become aware of a hidden and more exacting criteria covering maintenance. Webster defines maintenance as the "upkeep of property, equipment . . ." To the people in aviation, the word maintenance means much more.

It means more than patching skin, replacing pumps, safety belts and canopies; and it means more than repeatedly adjusting brakes merely for the sake of keeping an aircraft in a flyable condition. Of equally serious import are: What conditions necessitated the skin patching?" Why were the pump, safety belt and canopy replaced and what are the circumstances surrounding the need for frequent brake adjustments? These are some of the countless questions being asked daily. We know things are happening! But why are they happening? To those who need to know in order to develop a fix, a qualitative and analytical FUR would be akin to a blessing.

It is through the medium of FUR's that we learn about the shortcomings of the products you are both testing and operating—be they aircraft or torque wrenches. If you don't accurately report the deficiencies and failures encountered, you are doing an injustice to yourself; you are impairing the security of our nation and you are impeding the development capabilities of manufacturers serving our air needs. In this light, our concept of maintenance is that "we detect, analyze, evaluate and correct deficiencies, malfunctions and failures." Acceptance and observance of this simple formula will culminate in the highest order of maintenance—a goal that can and must be attained if we hope to contribute our share to air and yes—even space superiority.

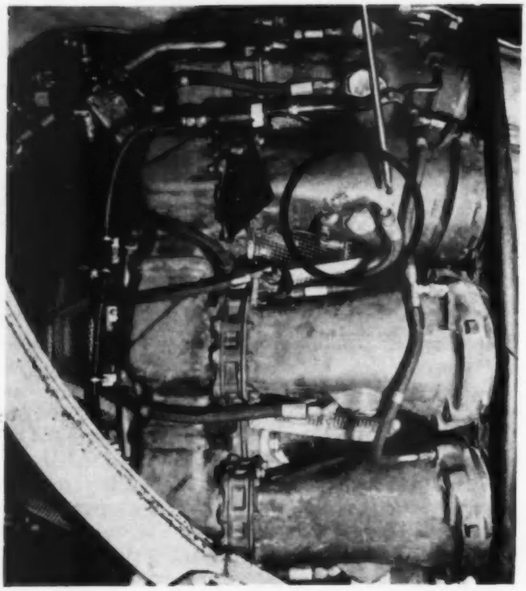
FOREIGN OBJECT—In an 180-degree left turn at 37,000 feet, .80 IMN, F4D-1 entered a roll from which the pilot was unable to recover. Ejection was successful.

This accident was caused by a foreign object of undetermined origin and identity being introduced into the control pedestal, jamming the mixer gears. Recommendations:

That all aircraft control pedestals be thoroughly inspected for foreign objects during acceptance checks and upon return from O&R or modification.

Please see "Isolated Case" page 36.—Ed.

Continued from preceding page



Burred threads of elbow fitting, circled in photo above, caused improper tightening of fuel line and crash landing of TV-2.

BURRED THREADS—At about 800 feet of altitude after takeoff in a TV-2 the engine began losing power rapidly. The loss of RPM, fuel pressure and oil pressure indicated a flameout had occurred. A crash landing was made after the pilot managed to clear a housing area. Bravo damage was incurred by the TV. The pilot and passenger escaped injury.

Cause of the flameout was due to No. 7 air adapter fuel line becoming disconnected. Burring was found on the threads of the elbow fitting, inset of photo above. Inspection of other aircraft for this discrepancy disclosed seven additional cases.

The primary cause of this accident was maintenance personnel error. The fitting was not tightened into the "seat" position. A single inspection of pulling on the hose will reveal any play between the end of the fitting and the nut on the flexible hose, notes the Second Endorser of the AAR. Samples of the fittings with burred threads were obtained and examination substantiated this.

OVERTEMPING T-BIRDS—In recent inspections of J-33A-35 turbine wheels conducted by three USAF overhaul depots, 14 percent of those checked were condemned because of pin hole and sixth serration cracks. If these jet engine turbine wheels had been continued in service they would have failed eventually—possibly in flight. It is suspected that turbine wheels in planes used for high altitude target towing and as target aircraft may be exposed to higher temperatures on the rear of the wheel because of angle of attack and reduced inlet of cooling air. Tests are underway to explore this possibility.

In the meantime, to reduce the possibility of turbine wheel failures in T-33 aircraft, organizations concerned should assure full compliance with paragraph 2-131, section II, T.O. 2J-J33-12 as required by the applicable -6 T.O. and whenever such turbine wheel blades are removed.

If doubt exists whether any crack discovered is within allowable tolerances, the turbine wheel should be shipped to the overhaul depot for "pep-Zyglo" inspection. Finally, the importance of monitoring temperatures, and properly recording amount and duration of over-temperatures during starting, acceleration and operation of T-33 engines should be emphasized.—*Excerpted from USAF "TIG Briefs"*

RETURN THE COMPLETE JET ENGINE!—Reports in Logistic Support Info Bulletins indicate that jet engines in some instances are being shipped without numerous parts and components.

It is known that in some cases engine parts and components retained have been used by local maintenance personnel to help keep other engines operable. This "cannibalization" of unserviceable engines seriously damages our future jet engine support capability.

TIRE INFLATION, TV-2—A recent field arresting gear accident which resulted in damage to the main landing gear fairing revealed the cause to be a combination of improper inflation of tires (low pressure) and the underway application of brakes.

Emergency Chain-type Arresting Gear Bulletin No. 6 states that the maximum height of arresting gear wire shall be 6 inches. With tires properly inflated, TV-2 ground clearance of the MLG fairing is just 6 inches and with underway application of brakes, it is possible to reduce this ground clearance to 4-1/2 inches, thus permitting the fairing to contact properly installed arresting wire.

It is recommended that pilots and mechanics determine positively that tires are properly inflated and pilots avoid the use of brakes when passing over the arresting gear wire.

This article, excerpted from General Electric's "Jet Service News," refers to an Air Force instruction regarding periodic calibrations of torque wrenches. A comparison of the practices within your unit may produce some interesting findings.

TORQUE WRENCH CALIBRATION—Some of the more common causes of either overtorque or undertorque are improper wrench calibration, not checking applicable manuals for specified value, misinterpretation of stated value and, the least excusable, complete disregard of special wrenches and specified values.

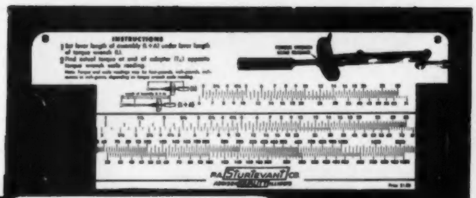
T.O. 32B14-3-1-101 (USAF) dated January 30, 1957 requires torque wrench calibration every 30 days. This is necessary since torque wrenches, like any other precision instrument, rely on certain mechanical adjustments for accuracy. Shops [O&R and Fasron] should calibrate these wrenches and mark them with a code to remind the user to have them re-calibrated periodically.

Individuals who perform the same task day after day often rely on memory for torque values. It is true that a man who becomes familiar with one particular operation can recall most of the procedures and values in the technical order, but he must periodically review the T.O. to see if any new procedures or torque values have been established. Remember, the consequences are too great to take a chance on memory.

One of the most common errors committed in torquing is misinterpretation of the Tech Order. Many mechanics read only the numerical value and not the Unit of measure. Inch pounds and foot pounds are not the same. The similarity starts and stops with the fact that they are a unit for measuring torque. Many cases of overtorque and undertorque have been traced to misinterpretation when reading the instructions. Remember, one foot pound equals 12 inch pounds.

The last, and undoubtedly most inexcusable cause of erroneous torque is refusing to use torque wrenches or procedures simply because you don't feel like it. Many mechanics think they can guess the correct amount of torque that should be applied, and that they can estimate the amount of force they should use. It is true that an experienced mechanic knows approximately how much torque a particular application should have, and he can judge with fair accuracy when he has applied that amount of torque. However, it is also true that the experienced mechanic will never guess and will always use a torque wrench or the proper procedure. Being experienced, he realizes the importance of proper torque and will never take a chance.

A good mechanic is a skilled man, and the dictionary says skill is "Technical Proficiency; the ability to use one's knowledge effectively." Let's all become good mechanics and help cut accidents and costs. Let's use our knowledge of torque effectively.



UPPER RIGHT: Reproduction of face of Torque Wrench Adapter Slide Rule. Torque readings can be readily computed when adapter is used on torque wrench.
BELOW: Reverse side of rule illustrates and explains use of adapters. See page 1, "letters" for information on where to obtain your rule.

GO-RIGHT, OR NO-GO!

Colonel James F. Wells

Chief, Aviation Safety Division, U.S. Army

The go-right or no-go design criterion is not new with the Army nor is it original to the Army. The Navy calls it "Murphy's Law." "If an aircraft part can be installed incorrectly, someone will install it that way."

In the Army we call it "Go-Right or No-Go" in an effort to urge designers to so design airplane components that they can be installed correctly but not incorrectly. In other words, they will go on right or they will not go.

For many years the go-right or no-go criterion has been applied to ordnance. This pistol cannot be assembled improperly because each piece has been so designed that it will not go on wrong nor can the pistol be assembled unless all pieces are installed.

The criterion has been applied to other ordnance as well. Rifles, machine guns, mortars and even cannons can be assembled only one way — the right way.

Although the go-right or no-go criterion is a very important one, it is only one of many contributing to safety in design. Others which have come to the attention of the Army are:

1. Improperly located or coded controls. An example of this was found in an off-the-shelf light airplane purchased by the Army some years ago. The carburetor heat control was located on the far side of the panel from the pilot immediately adjacent to the fuel shut-off control. Both controls had the same shape handle. Since the pilot could not divert his attention from the approach end of the runway on final, he selected the heat control by feel and in some instances inadvertently shut off his fuel at an altitude too low to restart the engine.

2. A part that can be safetied in an unsafe position. An example of this occurred on a helicopter on which the blades, after being unfolded,

were locked and safetied. The mechanic neglected to seat the feathering lock on one blade, nevertheless he saftied it. The pilot failed to catch the error because he inspected only for safety. In starting the rotor the blade flapped into the fuselage and cut off the tail.

3. An instrument susceptible to frequent misreading. An example of this is the 3-inch attitude gyro which has proved to be a killer. Another example in one aircraft is a red warning light located in such a position that the pilot must release his safety belt and shoulder harness and lean his head back into the passenger compartment to check its operation. In this spot it serves to frighten the passengers but gives little warning to the pilot.

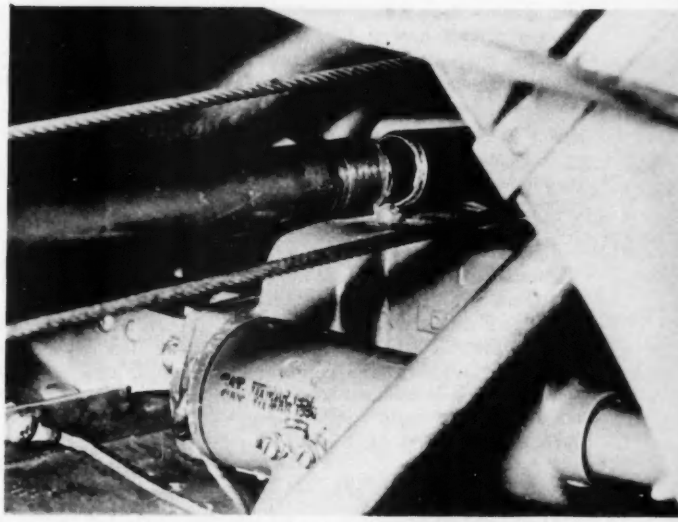
4. Interdependent components of incompatible strength. An example is a 20-G safety belt fastened with a 4-G anchorage.

5. Servo units which do not fail safe. In one current helicopter when servos fail, forces are such that the pilot is thrown into the opposite forward corner of the cockpit leaving the aircraft momentarily out of control.

Although pilot factor, or other human factors, appear in all of these examples, the fact is that they are deficiencies that can be "designed out" of the aircraft. I urge all engineers to so design components that they Go Right or No Go.

MURPHY'S LAW

If an aircraft part can be installed incorrectly, someone will install it that way!



. . . the mechanic concluded that it made no difference which way the actuator was installed so he installed it backwards . . .

DURING the installation of a new heat exchanger door actuator on a WV-2, the mechanic noted that the actuator could be installed equally well in either of two ways. Concluding that it made no difference which way it was installed, he put it on backwards. Nine flap operations later the torque tube severed (see illustration).

Examination of the backward installation revealed that with the heat exchanger door closed, there was sufficient clearance between the actuator and the torque tube. But when the door was opened it would contact the flap drive mechanism torque tube.

The WV-2 Handbook of Maintenance Instructions does not warn of the possibility of improper installation of this actuator, nor does it warn of the possible consequences of incorrect installation. The squadron has issued written instructions concerning the proper installation of actuator struts requiring inspection of finished work incident to all future actuator strut changes.

The squadron recommended that:

a. Parts be so designed that incorrect installation is not possible.

b. A change to the Handbook Maintenance Instructions WV-2 aircraft be made immediately which cautions maintenance personnel on the hazard of installing this actuator backwards.

Clipboard

Fire Truck Shovels

SHOVELS are on the inventory of all MB-1 and MB-5 fire trucks. Imagine the embarrassment of crash crews when they arrived at a crash scene with no shovels or equipment for beating out ground fires which threatened nearby private homes. It is recommended that all fire trucks carry old burlap bags for hand beating of certain types of fires and shovels for digging.

Also, not all the trucks had FM radio gear, or else it wasn't operating so that many trucks couldn't be directed into the scene over rough terrain. Obviously FM crash radios should be maintained at peak efficiency at all times. If fire trucks had their call numbers painted on the top of the cab, a plane could positively identify the unit and pass search and rescue directions to the tower for relay to the appropriate trucks.

ANSWERS TO WHIZ QUIZ, Page 23

1. Air Traffic Control.
2. You will be instructed to contact a communications station to receive an ATC clearance before entering the IFR portion of the flight.
3. VOR airways are identified as Victor airways by number. Low frequency airways by a color.
4. Odd thousand-foot levels—but see Rad Facs for details.
5. False. Flights may operate between cloud levels if VFR conditions exist between the layers.
6. True. Specified altitude assignments will be issued in each clearance.
7. Begin holding on a standard race track pattern, holding on the course and altitude at which you approached the fix, until further instructions are received.
8. Solid triangles; outline triangles.
9. False.

Friction Formula

When landing on wet runways remember that your coefficient of friction will be at its lowest point. When landing on a runway with even as little as ⅛-inch of water when you press your brakes so hard that you lock them you will probably water-ski. Your brakes will not be effective again until you release them or you pass over a dry spot on the runway. Remember this when using your brakes on wet surfaces. See your Squadron Safety Officer for coefficient of friction formula.

Unguided Missiles

. . . .on 1 May the main rotor of a cargo helicopter was damaged appreciably when the aircraft log book blew out an open window . . . in 1957 a reconnaissance helicopter was totally destroyed when the log book blew out and flew into the tail rotor . . . during summer when helicopter doors and windows are frequently open in flight or removed, it is particularly important that loose articles be properly stowed and secured.

U. S. ARMY DISPATCH
071856Z May

X-C Wisdom

"IT IS to be realized that each emergency presents a different problem . . . however, thorough knowledge of these procedures will enable a pilot to better cope with the emergencies he may encounter . . . The pilot, immediately after determining that an emergency exists, will establish communications with the ground station he is in contact with at the time. There has been a tendency in the past, on the part of the pilot, to minimize certain disorders that could become serious. This practice is not consistent with safety, since there may be insufficient time later to alert the agencies that can help . . .

Flight Handbook R4D-6, AN 01-40WD-1

D. A. The Easy Way

ONE technique for determining density altitude is to set 29.92 in the window of your altimeter. This will give you a certain number of feet. For every degree above 15 on your free air temperature gage, add 120 feet to the reading on your altimeter. This will be your density altitude. Of course be sure to reset your altimeter to station pressure before takeoff or landing, if you are in flight. (*This method suggested by Major Dave Hill, senior Army aviator serving as liaison officer at NASC.—Ed.*)

Teflon Hazard

BuAer dispatch 052045Z June is quoted in part and is of vital personal safety interest to all personnel:

". . . Death can result from inhaling fluorine compounds which can be released from even small pieces of Teflon by heat. Such compounds not released below 400° F. Exercise extreme caution to remove any Teflon chips, particles, or dust from hands and clothing, and especially to prevent any dust from contaminating smoking articles."

Teflon is a flourocarbon resin product, and, like its brother-in-law, nylon, it appears in many forms, can be molded, machined, and carved. It has many applications in modern aircraft because of its outstanding acid-resistant and insulative qualities. Teflon has been used in fuel and hydraulic lines and as gaskets and seals in hydraulic and oxygen equipment. For maximum safety of yourself AND OTHERS, do not dispose of Teflon scraps among materials intended for burning.

HATULANT

Well Done

FASRON 101

ATU 102

Not often does a unit decommission without an accident—not when the period is over five years of operating an average of five P2V-3Bs and amassing a total of more than 29,000 accident-free hours.

HATULant, which merged with VAH-3 in June to become RVAH-3, is justifiably proud of its safety record, attributes it largely to excellent maintenance, a demanding and thorough pilot checkout program, and strict adherence to the requirement for each returning flight to conclude with a GCA or range approach.

Engaged in training pilots, bombardiers/navigators and third crewmen for Heavy Attack Wing One, HATULant's 3-Bakers rarely flew less than 6 hours per hop, only a small fraction of which was cruising; most of each flight required constant, precise response to students' radar steers.

Maintenance kept the old 3-Bs up and available despite scarcity of many parts for that old model. And, because HATULant's training was geared to meet squadron deployment and indoctrination schedules, its own training schedule had to be met regardless of weather. Outstanding example of this was in 1954, when students and instructors piled aboard the P2V's on a hurricane flyaway and ground training classes were conducted in hotel rooms at the refuge city. Even the hurrevac flights, both ways, were utilized for training!

HATULant was commissioned at Norfolk 26 Feb 1953, with Cdr. C. C. Callaway as first CO. In 1955 it moved to NAS Sanford when HATWing One established its headquarters there. During its existence HATULant graduated 240 Heavy Attack plane commanders, 272 bombardier/navigators, and 163 third crewmen. In addition, over 1000 systems maintenance personnel and instructors were trained at Sanford.

Unit aviation safety officers who contributed to HATULant's effective safety program were Lcdr. J. S. Cleveland and Lcdr. J. E. King; CO at time of decommissioning was Cdr. R. E. B. Bower, Exec. was Cdr. Mike Michel.

. . . and FASron 101 . . .

Not leaving HATUlant unique in its claim is Fasron 101, also decommissioned in June with over 9½ years and approximately 12,000 hours of accident-free operations. Constant emphasis on safety and very high standards of aircraft maintenance contributed to their excellent record. CO at the time of decommissioning was Cdr. M. G. Emrick . . . WELL DONE, FASRon 101!

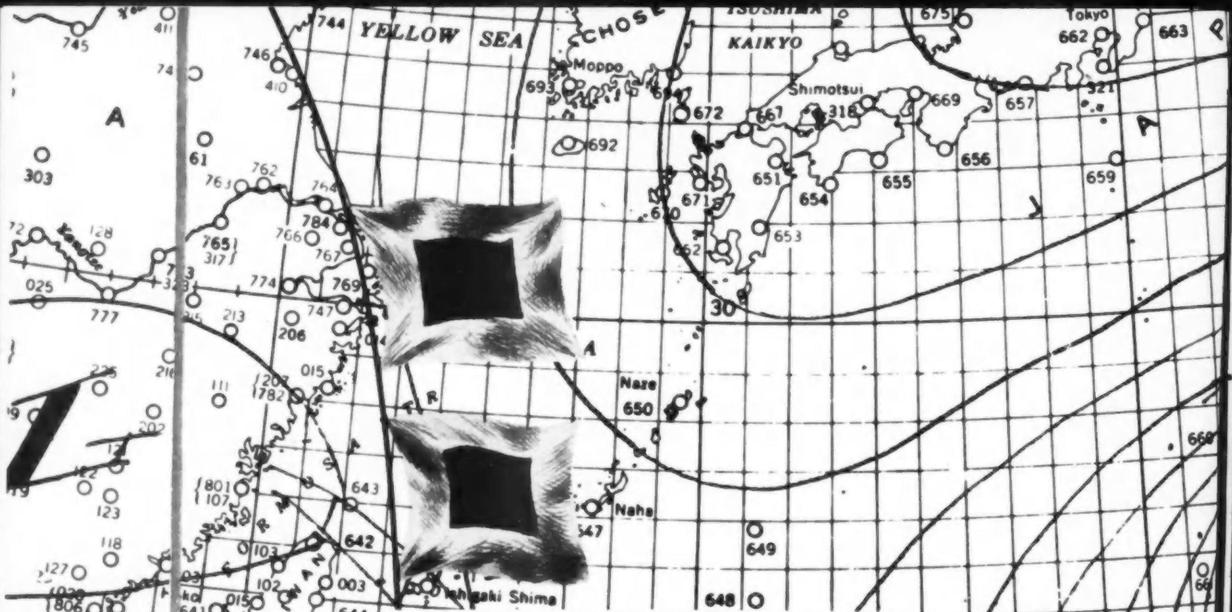
. . . and ATU 102 . . .

Advanced Training Unit 102, NAAS Kingsville, flew their 40,000th accident-free hour on March 27th, possibly setting a new all-Navy record for single-engine aircraft. A fatal mid-air collison in August 1956 was the last accident sustained by the unit.

Some statistical minded members of the group have come up with this information: during 19 accident-free months, ATU-102 flew 8,020,000 miles or 321 times around the earth at the equator, using about 1,640,000 gallons of fuel.

Between September 1956 and March 1958 the unit received 18 out of 19 monthly "ace's" awards, and in place of the one they missed, received a letter of commendation.

The unit has now been disestablished and the T-28 *Trojans* have been sent to Pensacola to be used for training purposes.



Nothing Ado About Much

. . . which just about sums up the popular attitude about weather, heavy or otherwise. O. Henry said, "We may achieve climate, but weather is thrust upon us." Mr. James Whitcomb Riley " . . . it hain't no use to grumble and complain, it's just as easy to rejoice, when God sorts out the weather and sends rain, why rain's my choice!"

Long before naval aviation the vagaries of weather were commented on by Mark Twain; in 1876 he described New England weather as, ". . . probable nor' east to sou'west winds, varying to the southard and westard and eastard and points between; high and low barometer, sweeping round from place to place; probable areas of rain, snow, hail, and drought, succeeded or preceded by earthquakes with thunder and lightning. . . " More recently, a Navy aerologist with years of experience and a Mark Twain touch flatly stated, . . . "any attempt to forecast weather in the Mediterranean Sea is ridiculous."

To those who can hibernate and ride out heavy weather with candles, sterno stove and Hershey bars, doing nothing about the weather is likely the least resistant path. But to those charged with the safety and operational readiness of aircraft, facilities and personnel, the current heavy weather season of typhoons, monsoons, williwaws and hurricanes requires much ado. The hurricane bill is effective only if it already exists, modified and corrected based on last year's experience, ready for immediate execution when the OP dispatch says, "carry out hurrevac . . . "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